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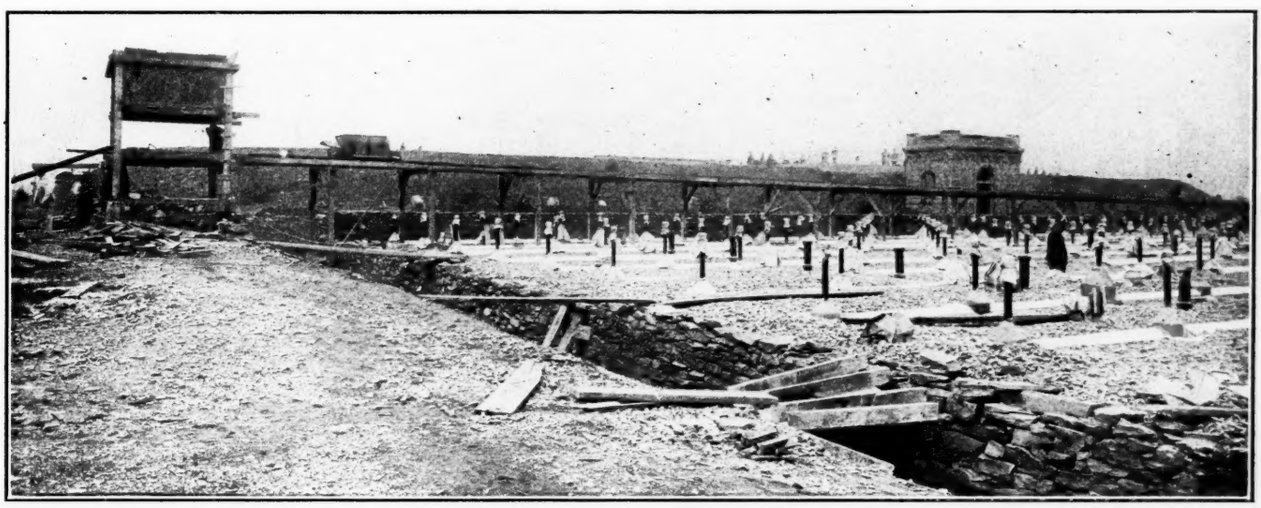


GENERAL VIEW OF HOLMESBURG SEWAGE TREATMENT PLANT

Filter Bed at Right, Stone Level with Top of Distributor Walls; Distributor Risers Set. In Background, Mound Around Emscher Tanks; Operating House Just in Front of This. Trestle in Place for Placing Stone on Bed; Trestle Bin at Left.

SEWAGE DISPOSAL IN PHILADELPHIA

Small Plant at Holmesburg Nearing Completion—Producer Gas Pumping Plant—Emscher Tanks and Sprinkling Filter—Novel Cam Control of Butterfly Valve for Regulating Nozzle Discharge—Other Details

A FEW years ago the city of Philadelphia was directed by the State Board of Health of Pennsylvania to prepare plans for treating its sewage, which is at present discharged into the Delaware River and its tributaries. As a preliminary to preparing plans for this purpose the city in 1909 established a sewage disposal experiment station, which was described in our issues of October 27 and November 3, 1909, and certain of their results and conclusions in the issue of April 12, 1911. About one and a half years ago a design was prepared for a small purification plant which, to a certain extent, may be considered as a larger experimental plant; although it was not constructed for this purpose, but because of the immediate necessity for treating the sewage of a small section of the city.

In the northeastern part of the city, on the Delaware River, are the Torresdale filters, by which is purified water derived from the Delaware River, which is supplied to considerably more than one-half of the city. Less than 2,000 feet down stream from the intake of the Torresdale plant there empties into the Delaware River a stream known as Pennypack Creek. This stream receives the sewage from a population which approximates 10,000, consisting of the residents of the district known as Holmesburg, a considerable percentage of it coming from a prison and house of correction. The Delaware at this point is a tidal stream and during flood tides the water from Pennypack Creek is undoubtedly carried to and beyond the intake, thus polluting the water supply; and although this supply is filtered, it is realized that, owing to the impossibility of obtaining 100 per cent. efficiency in any filter and the probability of occasional lapses in the average efficiency, any other practicable precaution against a distributing of typhoid germs by the water supply should be availed of. For this reason, as well as the general desirability of preventing the pollution of Pennypack Creek, an open stream

running through this part of the city and navigable for a short distance above its mouth, it was decided to treat the sewage which is at present discharging into the stream.

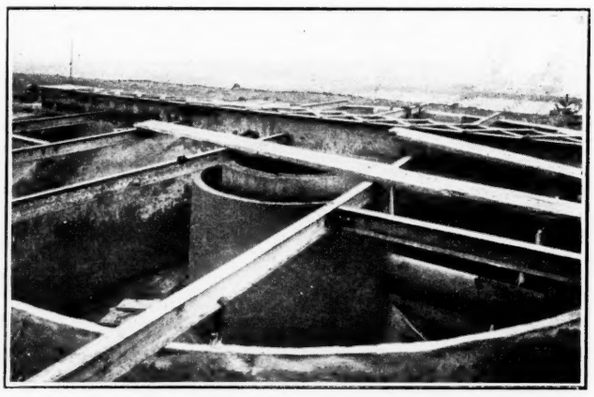
To effect this an intercepting sewer was run along the south bank of the creek, falling both ways towards a pumping station situated near the creek and about one-fourth of a mile from its outlet into the Delaware. From here the sewage is to be pumped through a force main under the creek and northward for about one-half mile to the purification works. These works are situated just south of the Torresdale filters and north of the prison and house of correction; the land occupied by all of these, together with some which is not now used for any particular purpose, being already the property of the city.

On reaching the pumping station the sewage passes first through a grit chamber and then through a coarse bar screen into a pump well. The grit chamber is designed to give a velocity of flow through it of about one foot per second, the bottom of the chamber narrowing as it descends, with the idea of as far as possible maintaining this velocity as the volume and consequent depth of sewage varies. The pump well is divided into a wet and dry well, as is now common practice, the pumps being Worthington volute pumps located in the bottom of the dry well so as to be always accessible, but below the elevation of sewage in the wet well. The pumps, one of which is an 8-inch and the other a 10-inch, are driven by two producer gas engines, the smaller combination having a capacity of two million gallons per day and the larger combination three million. Gas for the engines is furnished by a 150-h.p. Westinghouse producer. Although these are the normal capacities, the pumps are capable of lifting double these amounts at reduced efficiency.

The purification plant consists of two circular radial-flow Emscher tanks, the effluent from which is further purified upon sprinkling filters, and the effluent from these in turn passes through a final sedimentation basin. The sludge from the Emscher tanks is discharged upon a sludge bed, the drainage from which passes directly into the river. A small dosing house is being constructed between the sprinkling filters and the final sedimentation basin, where hypochlorite may be added when desired.

It was originally planned to pass the crude sewage through duplicate Reading screens, but Dr. Imhoff disapproved of this as being likely to remove from the sewage a large amount of the organic matter which was desired for the proper action of the Emscher tanks, and this idea was abandoned and instead thereof a double screen of novel design is being used. This consists of two rectangular baskets so constructed that they may be placed around the end of the discharge pipe in such a way as to form practically a complete cage or box. These two baskets or halves of the box are each fastened by four latches to a double collar which surrounds the pipe, carrying twelve rollers on its inner circumference, which permit them to revolve freely around the pipe. By this construction either or both of the baskets may be attached to the end of the pipe and revolved freely about the same. Ordinarily but one basket would be attached, which would hang below the pipe by its own weight, and receive the sewage which is discharged through an opening in the bottom of the pipe. Before this cage becomes choked with material the other half is lowered into place, where it is automatically held by four latches, the double cage is revolved through 180 degrees so as to bring the clogged cage on top, and the latter is then drawn up by a chain and block, the latches being released by small cams operated by the handles. When the basket is revolved and thus turned upside down, the contents is prevented from falling into the other basket by two sheet iron plates or "shields" which extend from the top of each end of the basket inclining downward toward the center, the two extending over about half of the area of the basket. The basket having been thus removed and raised to the surface is cleaned of the contained material, which material will probably be dried and burned. These basket screens are composed of 1-16 by ¾-inch bars arranged to give a ⅜-inch opening. Each basket is 3 ft. 9 in. by 2 ft. 3 in. and 2 ft. 3 in. deep.

After being screened the sewage passes to one or both of the two Emscher tanks, the discharge pipe passing through one tank, where it is furnished with an outlet controlled by a valve, and terminating in the second tank. These tanks are circular in plan and the sewage flows radially from the center outward. From the discharge main the sewage enters an annular space near the center of the tank, rises and flows outward over a circular weir, then outward and down and under a suspended baffle in the form of a ring, then still outward and upward and over discharge weirs into a channel which surrounds the tank. The inner weir is a ring which rests upon an inverted funnel-shaped surface, making an angle of 45 degrees with the vertical, which extends to within fifteen inches of the outside wall of the tank. The outside wall extends several feet deeper than this suspended inverted funnel, and rests upon a bottom which pitches sharply toward a small sludge pit in the center.



TOP VIEW OF EMSCHER TANK.
Top of suspended baffle wall in immediate foreground. Entrance weir and chimney in center. Discharge main entering weir ring from the right.

While the sewage is passing down from the first weir and under the baffle wall to the outer weir the suspended matter settles upon the upper surface of the suspended inverted funnel, slides down this to its lower edge and drops into the well beneath the funnel-shaped bottom of this well causing it to concentrate in the sludge pit in the center. Any gas formed in the sludge pit rises up into a central cylinder, a continuation of the inverted funnel inside of the inner weir, through which it escapes. Gas is prevented from rising between the suspended inverted funnel and the outer wall of the tank by an annular projection around the inside of the outer wall and immediately below the suspended funnel. A sludge discharge pipe is fastened to the bottom and side wall of the tank, rising to an elevation a short distance below the top of the weir, where it passes through the wall and to the sludge bed. A small lead pipe is also attached to the side wall and bottom of the tank for supplying water under pressure to stir up and liquefy the sludge when this is necessary to start it flowing at times of discharge, another lead pipe being fastened in a horizontal ring around the vertical wall of the tank and provided with a number of holes, to be used for the same purpose when necessary.

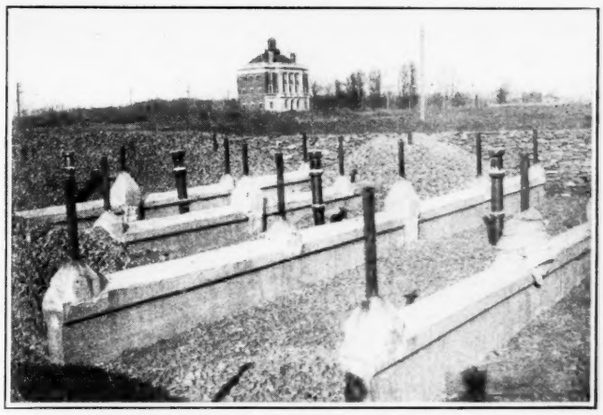
All of the tank is constructed of reinforced concrete. The suspended funnel rests upon eight beams which radiate from the central chimney and rest at their lower ends upon the annular projection from the outer wall of the tank. Connecting these beams and supported by them

is the funnel-shaped surface, which was made on a form by first placing in position the reinforcement, then pouring onto the form a concrete thin enough to pass through the reinforcement but not so thin as to prevent its remaining in place without the use of a top form. The top surface was plastered carefully by hand and a fairly smooth surface of uniform slope was thus obtained. This surface was one of the important elements of the tank, since it is necessary to insure that the deposited matter will slide down this into the basin beneath. Experience in Germany seems to have shown that this is insured not so much by the actual smoothness of the surface as by the uniformity and steepness of the slope; since, whatever the material, it soon becomes covered with a slime.

The force main is a 14-in. c. i. pipe, the sludge pipe 12-in. c. i. The tank has an inside diameter of 30 ft. and a maximum depth of 33 ft. 4 in. The chimney is 4 ft. 6 in. inside diameter. The inner weir is 9 in. from this all around and is of concrete 3 in. thick. The baffle wall or curtain is 7½ ft. high (rising 6 in. above the inner weir) and 1½ in. thick. The annular projection just below the bottom of the inverted funnel extends 24 in. from the side wall, or 9 in. inside the edge of the funnel. The outer walls of the tanks are of reinforced concrete 18 in. thick. The two Emscher tanks are 80 ft. apart between centers. From each a 12 in. by-pass pipe leads directly to the filter beds.

A heavy central beam—a latticed box girder—spans the tank in one direction, resting upon the top of the outside wall, and at right angles to this and resting upon it and the outer wall are other light I beams. From these beams is suspended by hangers the baffle or curtain wall. The latter was formed by suspending in place a sheet of expanded metal, bent to the proper circular shape, on each side of which was wired light plastering lath; and cement mortar was plastered on each side of this so as to give a total thickness of 1½ inches. Both these tanks were built almost entirely above the original surface of the ground, the vertical outer walls being poured in wooden forms. The soil excavated in the construction of the sprinkling filters was used to build an embankment around these tanks and extending for some distance north and south of them, the sides of which will be graded and sodded and the whole planted with trees and shrubbery.

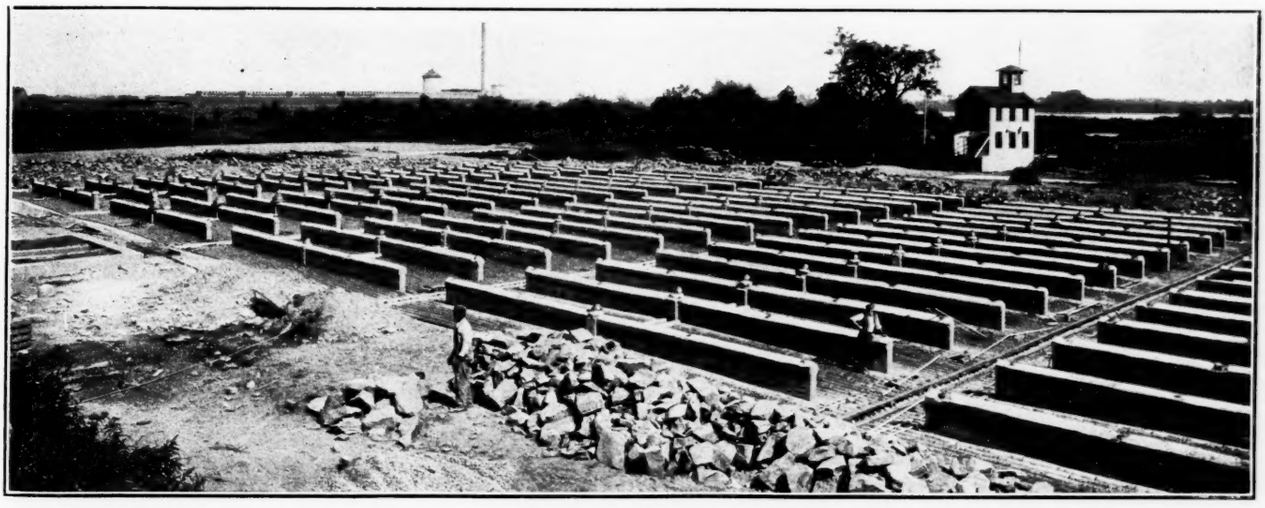
Between and immediately east of these tanks is a small dosing tank which receives the discharge from the Emscher tanks. This is a plain concrete box with vertical sides, a main outlet pipe in the center of the bottom, a small outlet pipe near the water surface, and a float attached to the end of a chain. The float chain passes up over a pulley and down to a Cutler-Hammer switch on the outside of the tank, buttons being arranged on the chain so as to throw the switch as the sewage in the tank rises above a certain point, and throw it back when it again falls below that point. This tank is 15 ft. by 25 ft. by 7½ ft. deep.



DISTRIBUTOR WALLS AND RISERS.

Vertical iron distributor risers and vitrified ventilator pipes. Broken stone to full height in background.

The Emscher effluent discharged through the main outlet of the dosing tank passes through the basement of a small operating house, where there is a butterfly valve, and a gate valve on each side of this, so that by closing these the butterfly valve may be removed for alteration or repair. The butterfly valve is to be opened and closed at a varying rate to be determined by experiment, in order to produce a varying rate of flow and head upon the nozzles of the sprinkling filter and thus secure uniformity of distribution on the filter. The power for operating this butterfly valve will be obtained by means of an overshot water wheel which will be operated by a small part of the Emscher effluent withdrawn from the dosing tank by the small pipe above referred to. This water wheel revolves a cam which moves one end of a lever, the other end of which moves the arm of the butterfly valve. There are two cams, one of which is designed to provide for a rate of flow of two million gallons a day, the other for a flow of four million gallons. A collar is placed between these two cams carrying two pins, each of which can be made



SPRINKLING FILTER SHOWING DISTRIBUTOR PIPES EMBEDDED IN CONCRETE WALLS

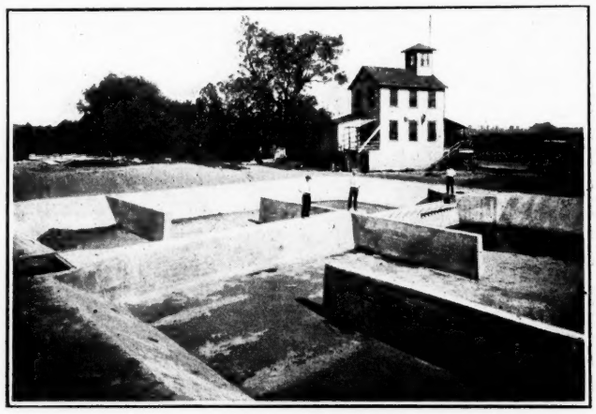
Split Pipe Drains Laid; Also Main Drains, but Cover Plates of Latter Not Set. Foundation of Operating House in Left Foreground. Torresdale Filters in Left Background

to engage with one of the cams by throwing the collar toward the one it is desired to use. This throwing is done by an electro-magnet connected with the Cutler-Hammer switch previously referred to. Ordinarily the two-million gallon cam will be engaged, but should the float in the dosing tank rise sufficiently high to throw the switch, the collar will be engaged with the four-million gallon cam. This whole contrivance is believed to be novel, and originated with Principal Asssistant Engineer George E. Datesman and his assistants. To a large extent this is, it will be seen, a development of the apparatus used in the experiment station and described on page 667 of Vol. XXVII. of Municipal Journal.

After passing through the butterfly valve the Emscher effluent goes to the sprinkling filter. This filter has an area of about .95 of an acre. It is composed of 6 feet of stone which has passed a 3-inch screen and is retained by a 1½-inch screen. Most of this stone is obtained by the contractor at quarries some distance away and brought about twenty miles by rail to a siding about one-fourth of a mile from the plant. The remainder of the stone is obtained from a quarry near the plant, where it is broken by hand by the inmates of the house of correction. These two stones are different in their structure as well as in the method of breaking and are placed in separate parts of the bed. The bed is surrounded by a dry rubble wall. The sewage is discharged through Taylor square nozzles spaced about 10.8 feet apart at the corners of squares, fastened to the tops of vertical iron risers which are fed by 18-inch pipes running across the short dimension of the bed and imbedded in concrete, these feeding pipes being given a fall of 18 in. so that the grade shall compensate for friction in the pipe and the head on the nozzles at the further end of the pipe be as great as at the near end. Each feeder pipe is separately controlled so that it can be shut off and the filter is thus divisable into five separate units. Each feeder pipe or main distributor has 6-inch branch distributors at intervals of 10.8 feet, leaving it at right angles; and from these, resting in T specials, rise 3-inch vertical iron risers.

Midway between each two lines of feeder pipes is a 12-inch main drain, toward which the floor slopes in both directions. This is a semi-circular channel in the concrete floor, covered with reinforced concrete slabs which are laid with spaces about 1-16 inch wide between them. Leading to these are split pipe drains which were bedded in the concrete bottom just before the top surface had taken its set, so that they may have a bearing throughout. These drains conduct the filter effluent to a small underground chamber east of the filter, from which it is discharged through several ports into the final sedimentation basin. This basin is divided into two parts by a medial wall, in the bottom of which is laid a bypass pipe by which the filter effluent can be carried directly to the river if desired, or the sewage can be diverted to either half or both halves of the sedimentation basin. Each half is provided with two baffle walls to assist in securing sedimentation, and the effluent leaves the basin by a trough in the top of the further third of the partition wall, overflowing from the basin into this trough over the two sides of the trough, which thus serve as weirs.

The filter bed is 272 ft. long by 153 ft. wide, net area of stone. The sedimentation basin is 80 ft. square on top and 4½ ft. deep, or 3½ ft. to the crest of the weir. The



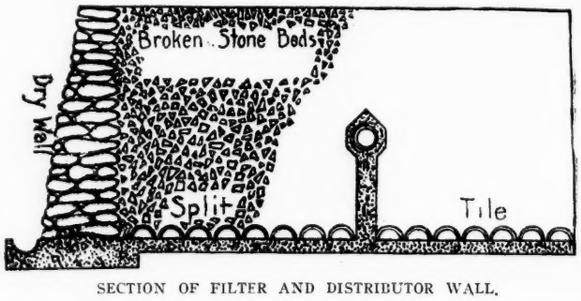
FINAL SEDIMENTATION BASIN.

Overflow trough in background. Iron rods set in concrete sides of trough, to which are to be fastened wooden scum boards.

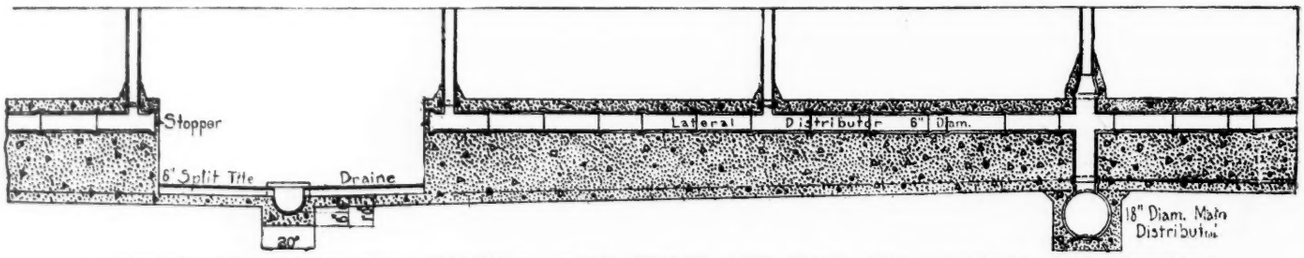
surface of the filter is 9 ft. 9 in. below the water surface of the dosing tank.

The sludge pipe from the Emscher tanks has a considerable fall to a sludge bed just north of the sedimentation basin. The bottom of this sludge bed is provided with underdrains, around and above which are placed a few inches of broken stone, followed by graded gravel and coarse sand, the last to a depth of about six inches. This bed is located on the edge of a slope which falls several feet toward the river, and the underdrains discharge onto the surface part way down this slope. This sludge bed or lagoon is 71 ft. by 75 ft. on the surface of the sand. The 12-in. sludge pipe, 325 ft. long, is supplied with six flushing Y's for cleaning it.

The area of the filter bed, .95 of an acre, is expected to afford satisfactory purification for a dry weather flow of two million gallons and a wet weather flow of double that amount. In a number of cities where satisfactory purification is obtained with a rate of two million gallons per acre the actual efficiency of distribution is 50 per cent. or less, while in the experimental use of the butterfly valve distributing system, of which the mechanism adopted for the Holmesburg plant is a development, an efficiency of 86 per cent. and even higher has been obtained. The engineers of the Philadelphia department, therefore, hope to be able to obtain such uniform distribution as to be able



SECTION OF FILTER AND DISTRIBUTOR WALL.



SECTION OF FILTER BED SHOWING MAIN DRAIN AND MAIN AND LATERAL DISTRIBUTORS

to use their sprinkling filter at a rate of three million or three and a half million gallons per day with equally good results. As the sprinkling filter is divided into units, as explained above, it will be possible to test this in this plant by the use of various fractional parts of the bed.

As one of the objects of this plant is to eliminate typhoid bacteria from the water supply, and as the several elements of the plant so far described have as their chief result the reduction of organic matter rather than of bacteria, it is proposed to provide for the use of hypochlorite as a sterilizing agent. This will be added to the filter effluent, being applied to this just before it enters the sedimentation basin.

As this plant is a comparatively small one, the contractor did not provide any special plant for its construction. Perhaps the most elaborate arrangement is that for the distribution of the broken stone, the contract price of which in place constitutes about one-third of the total for the entire plant, which is about $66,000. Most of the stone is brought by rail to a siding about one-fourth of a mile from the plant. Here it is transferred from the cars to a bin by the use of a boom derrick and grab bucket. From the bin the stone is discharged into bottom dump wagons which haul it to the site of the plant. Here there is a small platform raised about four feet from the ground and provided with inclined approaches on each side, the top of the platform being hinged on one side and provided with a heavy iron eye on the other. The teams drive up onto the platform on one side, dump their load and leave by the inclined driveway on the other side. Near the platform is a boom derrick which handles the broken stone in three one-yard buckets. These three buckets are placed

DUMPING PLATFORM.
Stone sliding from raised platform into buckets in front on the ground.

under the hinged side of the platform, the hook on the end of the derrick mainfall is caught in the eye and the platform raised to an inclined position, which slides the broken stone off into the buckets. When one of these is filled it is picked up by the derrick mainfall, the boom is swung around and the bucket is discharged into another bin placed at the end of a low trestle, the platform, derrick and trestle bin being so placed relatively that the boom does not need to be raised or lowered at any time. This trestle is carried across the filter bed, being moved from time to time. From the trestle bin the stone is discharged into cars which are run by hand along the track on the top of the trestle and dumped where desired, the trestle having a slight incline downward from the bin to facilitate handling. This makes four handlings, two by derrick, one by teams and one by the trestle cars, in conveying the stone from the car to the filter. It seems to us that at least one-third, if not one-half of the cost of handling could have been avoided by laying a driveway on the trestle and having the teams drive onto this and dump the stone directly into the filter bed, passing off the trestle at the further end and back to the railroad siding. This would have required about 500 feet longer travel of the teams, but would have avoided the use of the second derrick with its engineer, the dumping platform with the four men employed in operating this and the buckets, and the two men used in handling the cars on the trestle.

Before dumping the stone into the filter bed, stone is placed by hand to an elevation of at least six inches higher than the top of the sub-drain pipe, in order to avoid breaking the latter. While the stone is being dumped from the trestle the top surface is graded by hand; but it is necessary, in finally finishing the top grade of the stone, to bring on more or less additional stone by wheelbarrow. The price paid for this stone in place is $2.15 per cubic yard.

This plant provides for a very small part of the sewage of the city, and can hardly be considered as an important part of the general scheme. According to the direction of the State Board of Health, the city must submit in a very short time a general plan for the entire city, and this plan is being prepared on a basis of a population of three million, or about 300 times that tributary to the Holmesburg plant. The report has not yet been completed, but it may be said that in general it provides for dividing the city into two districts, the northeastern and southwestern parts of the city respectively, each with its disposal plant. The topography is such that all or at least a very large percentage of the sewage would need to be pumped to the disposal plants even if there were several of them, so that it is calculated that there would be little, if any, economy in constructing a number of plants in the several minor drainage areas rather than these two plants at the opposite sides of the city. Intercepting sewers will be run along the Delaware and Schuylkill Rivers and other drainage valleys. Both the plants will be located on the Delaware River and will, it is believed, consist in general of "two-story" sedimentation tanks (probably the Emscher tank) followed by filtration (probably sprinkling filters).

REFUSE DISPOSAL FOR ST. LOUIS

Frequent Collections Desired—Open Ash Bins a Nuisance—Incineration of Rubbish—Ashes—Street Sweepings

WHILE the city of St. Louis has provided for the collection and disposal of garbage, it has done nothing towards enabling the citizens to dispose of their ashes and rubbish, and it is stated that the average annual expense to the householder for having these hauled away by private teamsters is not less than $5 a year. As there are more than 100,000 householders in the city, this means an annual expenditure of at least $500,000 by the citizens for the removal of these materials. It seems to be generally believed, both by the city officials most competent to judge and by the Civic League, that the city could do this work more satisfactorily at a very much lower cost; but for some reason the city has not yet undertaken the work. An ordinance was approved April 11, 1910, providing for the collection of combustible and non-combustible waste and the disposal of the same, this to take effect thirty days after the necessary appropriation is made by the municipal assembly, but for some reason the appropriation has never been made.

At present most of the householders have in the rear of the lot a brick receptacle into which is thrown ashes, sweepings, paper and other refuse matter and often, though illegally, garbage. These receptacles are wide open and the materials are scattered over the streets and alleys by the wind and in other ways. The ordinance which has been passed provides for the placing of ashes in metal receptacles holding between ten and twenty gallons and the

rubbish in receptacles or in bundles securely tied, both of which are to be collected once a week between May 1 and November 1, and twice a week during the other half of the year. The carrying out of this ordinance would do away with the nuisance of the large open ash bins and would relieve the householders of a considerable part of the cost of removing the refuse. Street Commissioner James C Travilla estimated that the cost of this work in 1911 would have been $169,930. As there are no dumps in the central part of the city he figured on providing a number of receiving stations within this territory, where the refuse would be loaded on cars and hauled out of the city.

The Civic League suggests that the ashes be disposed of in this way, but that the combustible rubbish be burned, after the marketable materials have been picked from it. Based upon experience in New York they estimate that each ton of rubbish would yield such materials to the value of $1.44. They also figure on utilizing the heat from the combustion and obtaining therefrom 85 to 90 hp. of steam per ton burned per day, generating thereby 50 kw. h. of electric energy, which they value at 5 cents per kw. h., which would yield them $1.25 per ton of material, in which calculation we fear they are over-sanguine.

They estimate that a rubbish destructor of 150 tons capacity would cost $60,000, with $10,000 additional for land; figuring 4 per cent. interest on the investment and 10 per cent. depreciation on the destructor gives a fixed annual cost of $8,800, and estimating 40,000 tons of rubbish and $1 per ton as the cost of operating and maintaining the plant gives $48,800 as the cost of burning, or $1.22 per ton. Even assuming that the heat was not utilized for generating steam power, but that as much salable material was obtained as was estimated, there would still be a profit in operating such a plant instead of the cost of hauling it outside the city at a net loss.

The street sweepings they believe could be either mixed with the ashes, burned in the incinerator, or possibly be utilized as fertilizer. The barn litter there is no trouble in disposing of, as the railroads compete with each other in purchasing it from barn owners and hauling it outside the city, where it is sold to the farmers.

BITUMINOUS MACADAM

Methods Recommended Described in Detail—Spreading Stone—Harrowing—Rolling—Applying Bituminous Binder—Specifications for Binders

Paper Before Indiana Engineering Society by A. N. JOHNSON, State Engineer Illinois Highway Commission

Observation of macadam roads built with a bituminous binder seems to point to the success of this form of construction on many miles of road, and it is with this construction that the present paper will deal, without an attempt to discuss further the merits of this construction in comparison with other classes of pavement.

There are many features to be considered in the construction of bituminous macadam which the limited scope of this paper will necessitate passing over with but slight mention. As with any ordinary macadam construction, it is of prime importance that the road-bed be properly prepared both as to drainage and compactness, yet, fundamental as are these requirements and as supposedly well understood, no small number of the failures seen to-day can be attributed to lack of attention to these important features of the construction. If the road-bed has been properly drained and compacted, there will not be required a greater thickness of completed pavement than seven to eight inches. The material should be put on in two layers, the first layer forming the base on which the wearing layer is to be placed.

The method of placing the base usually does not vary, whatever may be the type of construction used for the top layer. It is essential that this base layer be compact and true to shape, and this cannot be accomplished unless the stone is well spread, thoroughly harrowed and rolled, and then well bonded with stone dust or gravel in the same manner and with as much thoroughness as though the road were to be left with an ordinary waterbound surface.

The size of the pieces of stone in the different layers is a matter for some consideration. It has been the practice of the Illinois Highway Commission to use stone varying from one inch to two and one-half inches in size. As practically all of the stone available for road work in Illinois is limestone, there is required a somewhat larger-sized material for surface work than is demanded with a harder variety of stone. Also, it has been found convenient to use but one size of stone in both layers of the road, so that the screens at the state crushers are provided with one-inch holes and two and one-half-inch holes, and no intermediate size. A dust screen with three-eighths-inch holes is used to prepare stone chips from the one-inch material.

The depth to which the stone is to be spread for the base depends upon the thickness the base is to be after it has been rolled. If the total thickness of the pavement is to be eight inches, the wearing surface is not usually made less than two and one-half inches in thickness, leaving five and one-half inches for the thickness of the lower course. If the material for the top course is composed of two and one-half-inch sized pieces, it is recommended that this layer be made three inches thick, leaving five inches for the thickness of the base. A layer of stone about six inches thick, measured loose, will roll to five inches, possibly a little less, depending somewhat upon the nature of the material.

After the stone has been spread to the required thickness, which should be done with great care so that there will not be more in one spot than in another, it should also be thoroughly harrowed with a coarse tooth harrow. The effect of this is to shake the various sized pieces of stone into place, and, as is well known, a box of loose stone can be compacted no better than by shaking them, so, too, we find that the loose stone in the road is compacted by shaking or harrowing, which allows the smaller pieces to take their natural position at the bottom of the layer and the larger near the top. It will be found, moreover, that harrowing the material in this way will permit the roller to compact the material without the creeping that is often observed, and with one-half as much rolling.

The lower course should not be covered with screenings until it has been thoroughly compacted and each piece of rock keyed tightly in place so that when a wagon load of screenings is driven upon it the wheels will disturb the rolled stone scarcely any, if at all, and leave no decided rut or track. The screenings should be spread evenly over the whole surface and slightly watered. If the foundation is clay and wet weather has prevailed, the greatest care must be taken in watering the screenings of the first course before the road is tightened, otherwise the surplus water will soften the foundation, which must be dry before further progress can be made. After the screenings have been slightly washed or worked into the stone, more should be spread and again watered and then rolled to tighten the surface, more water and screenings being added until the surface of the base, or lower layer, is water-tight. Screenings should not be applied so as to separate the pieces of rock which have been already keyed, but merely to fill the voids in the compacted stone with as little disturbance as possible.

The amount of crown that the finished road is to have will decide the amount of crown that the earth roadbed and the base should have. Space will not be taken here to present the various arguments for a greater or less amount of crown. In general, the observation of the writer is that

one-half inch per foot is not enough for the average country road with a bituminous macadam top, nor is it practical to exceed three-quarters of an inch per foot. On roads to sixteen feet in width, not less than three-quarters of an inch per foot is advisable. On roads twenty feet in width or wider, indicating that there is a large amount of traffic spread more or less evenly over the whole road, the crown can be somewhat less than on the narrower roads, but it should never be less than one-half inch. On the wider roads, a good practice is to increase the crown somewhat towards the gutter, perhaps starting on three-quarters of an inch and gradually flattening towards the center, which would be effected by a curved cross-section.

On narrow roads, twelve to fifteen feet in width, it is necessary to give special attention to consolidating at least three or four feet of the earth shoulder on either side of the road to hold the stone in place. As can readily be appreciated, when the roller is near the center of the road, there is a tendency to push the stone sidewise, and if there is nothing to resist this movement the stone becomes more and more open as the roller proceeds and the pieces of rock do not tighten. On wider roads, there is not so much difficulty from this cause, as a small amount of rolling towards the edge of the stone at first will place it sufficiently solid to resist any further movement of the stone at the center, for which reason it is very much easier to get a well-shaped, well-compacted road that is eighteen feet or wider than one but twelve feet wide. We now come to a discussion of the bituminous surface proper.

There are various methods of construction employed for bituminous macadam surfaces. They are usually divided into two general classes, one where the material is mixed with the binder before being applied to the road, called the "mixing method," the other by which the rock is first placed upon the road and the binder poured into it, usually called the "penetration method." By far the largest amount of work undertaken by highway engineers on country roads is by the penetration method, for the simple reason that it is very much cheaper and more practical for the conditions usually existing in country road work. This method alone will be discussed in detail. Moreover, it is the conviction of the writer that with the binders ordinarily employed for this work and for the traffic conditions usually prevailing on the majority of country roads, the best results will be possible with good construction by the penetration method.

As is well known, the stability or strength of a macadam road surface to resist the action of traffic depends entirely on the mechanical locking together of the pieces of stone making up the road surface, and until this is accomplished the road surface has no cohesion. The more perfect this keying or locking together of the pieces of the stone, the more rigidity, therefore the object of any binder, whether of stone dust or of bituminous character, is to hold the pieces of stone firmly in position after they have become well keyed and locked together. In many pieces of road that have been constructed, and in some forms of construction that have been proposed, this essential principle of the macadam construction seems to have been ignored; as, for example, in the type of road employing some form of bituminous binder in which the pieces of stone of the wearing surface do not come in contact at all, but are held apart by the bituminous material, which here acts as a matrix, forming in reality a bituminous concrete, similar to ordinary concrete, in which the matrix of cement mortar is replaced with a matrix of bituminous material. If, therefore, the matrix is not in itself sufficiently strong and rigid to withstand the pressure of traffic, such a road is doomed to failure, particularly if submitted to the traffic conditions on most country roads where the traffic tends to keep to a more or less narrow strip of the road, bringing undue pressure thereon. The fact that some of the roads built with a bituminous matrix have proven fairly satisfactory is chiefly because the traffic conditions, under which they are used, so rolls and works the road that one portion receives about as much pressure as another, and if there is a slight tendency to give at one time at one point, subsequent traffic will tend to roll out the unevenness that has been formed. Roads of this character that have come under the writer's observation, although giving fair satisfaction with the conditions under which they are used, would last but a short time under country road traffic. Thus it would appear that if bituminous macadam is to be successful it is necessary in its construction to follow what has been learned by long experience, and that is to have the macadam itself firmly locked and keyed together and the stability of the road thereby assured before any binder has been applied.

The next step, therefore, after the base course has been prepared, as has already been described, is to spread the stone for the wearing layer. The stone for this layer, if limestone, should be composed of pieces two and one-half inches in size and graded from this downward. If a three-inch layer is to be made when consolidated, which is as thick as this layer need be, the stone should be spread to a thickness of three and one-half inches and thoroughly raked or harrowed so as to bring the larger pieces to the surface in order that the surface may be composed in the first instance of as nearly uniform sized material and to give as great compactness as possible after it is rolled. As soon as spread uniformly and harrowed, the surface is to be rolled until it is thoroughly tightened. It may be found that there will be places where the stones do not lock together firmly; on such places a small amount of stone should be spread, just sufficient to fill the insterstices, and then rolled. The effect of this rolling is to force the pieces of stone into the interstices, thus keying the whole surface until tight. It is important that great care be taken in rolling this upper layer that it be thoroughly tightened. When this has been accomplished, there will still remain interstices of appreciable size which should be filled with stone chips. These chips should be preferably of some harder material than limestone, and it is often possible to secure screened gravel that will prove excellent for this purpose. The size of the chips should vary from one inch to three-eighths of an inch, and they should be spread over the surface of the upper course just sufficient to fill the interstices.

A good method to insure this being done is first to shovel the chips on by hand, throwing each shovelful so as to cover as much area as possible; then follow with hand brooms, sweeping ahead the surplus pieces and allowing all the interstices to become thoroughly filled. When this is done, the road is ready for the bituminous binder, as no rolling should be attempted after the chips have been spread and before the binder is applied. If the chips are rolled before the binder is applied, the effect would be merely to allow them to set in between the stones which have already been keyed and tend to loosen the surface rather than tighten it, so it is important that after the surface has been thoroughly keyed and the chips spread, no rolling be done until after the bituminous binder has been applied.

There are various methods of applying the bituminous binder. One method is to turn the heated binder into cans, thence pouring it on the roads, and many roads have been built in this manner. There is to be seen in almost all work of this character, unless an exceptionally skillful man is employed to do the spreading, places in the road where the binder has been applied thicker in one place than another, and the joints where one sweep of the can is followed by another can usually be seen. This unevenness is generally much more pronounced after the road has been in service than immediately after construction, so that evenness in the distributon of the binder is found to be a most important detail. Binders have been spread by machines having a number of nozzles or openings side by side, which

are moved over the surface of the road, the binder being thus distributed in a layer a number of feet wide at a time. In some of these machines the binder flows from the nozzles merely by its own weight, generally termed gravity machines, while with others pressure is applied. Binders have also been applied through a single nozzle at the end of a hose.

Experience seems to show the importance of the following conditions being observed. The binder must be spread uniformly, that no more binder be used than is necessary to cover the surfaces of the stone and the chips. To get these results it is necessary that the binder be put on, as nearly as possible, in the form of a spray, and owing to the fact that it is practically impossible to get a thoroughly uniform surface condition before the binder is applied, it may be necessary to apply slightly more binder at some point in the surface than another, so the writer has found in his work the best results have been obtained by applying the binder through a single nozzle of such a form that the binder is thoroughly atomized and is delivered to the road in the form of a finely divided spray. With this method of application there has been found no difficulty whatever to get the binder on as uniformly as is required, and at the same time to have sufficient control to give those spots on the road that may need it, the special attention they require.

The device that has been in use on the work of the Illinois Highway Commission consists of a tank wagon, holding about 500 gallons, supplied with a fire chamber. The tank, which is cylindrical, is sufficiently strong to withstand a pressure of 60 to 80 pounds if found needful. The tank wagon is fastened behind a roller or tractor, to which is attached a Westinghouse air pump with a metal hose leading from the air pump to the distributing tank, on which is a guage so that the pressure may be controlled by the operator of the tractor. Leading from the tank wagon is a metal hose which ends in a nozzle made of a two-inch iron pipe, with a right-angle bend, in the end of which a plug is screwed, having an opening about one-half inch in size; on the inside is a small cone, so that by screwing the plug more or less tight the size of the orifice can be regulated.

Leading into the two-inch pipe forming the nozzle there is introduced a one-half-inch steam pipe which is connected back to the boiler of the tractor. The steam pipe extends within the nozzle to just above the orifice. When in operation, the pressure is applied to the wagon, thus forcing out the bituminous binder. The steam is turned into the nozzle as the binder issues, which tends to spray and break the bitumen into very fine particles, the effect being a sort of mist which can be very nicely regulated so that any given amount of material, from a mere wash to any quantity desired, can be applied.

It is important that all hose connections for this work be of metallic type, as lighter hose or hose of any other material will soon become rotted or burned by the high temperature necessary for most of the bituminous compounds used.

Also, the complete outfit includes an extra heating tank of the same capacity as the distributing wagon, which, as soon as empty, may be readily filled from the auxiliary tank. To do this, the air pump is reversed, creating a partial vacuum in the distributing wagon and the binder sucked back through the distributing hose, which is inserted into the auxiliary wagon. With one auxiliary kettle and one distributing wagon, each of 500 gallons capacity, fifteen hundred to two thousand gallons per day can be applied. Additional auxiliary heating kettles would increase the output. Working continuously, a maximum of 500 gallons per hour can be applied. On most jobs, however, where but one roller is available, fifteen hundred to two thousand gallons per day will be about as fast progress as can be handled efficiently.

The binder issuing under pressure and carried by the force of the steam, will fill all the interstices and cover the sides of the rock and the chips with a thin layer. Enough of the binder should be applied so as to leave none of the surfaces of the stone that are visible uncovered. Care should also be taken that the binder strikes the surface perpendicularly; otherwise, if applied in a slanting position or if the nozzle is moved too rapidly across the road, it will be found that one side of the stones will be covered with the binder, while the other side will have but little. The amount of binder to be applied should be as little as is necessary to secure a thorough coating for all the exposed surfaces of the stone. This usually requires from three-quarters of a gallon to one gallon per square yard. When this treatment has been applied, the surface should again be treated with the stone chips so as to make practically one layer of the chips evenly distributed over the entire surface of the road. These chips had better be applied as soon as possible after the binder has been spread, if practicable following immediately behind the spreader. They may be spread somewhat in excess and swept ahead with a broom. It is important that the chips be clean and have as little dust adhering to them as possible. One advantage noticed with the steam jet in connection with the operation of this apparatus is that the force of the steam seems to blow the dust from the surface of the stone and thereby insures a cleaner surface for the binder.

After the chips have been spread the second time more binder is applied, which should be sufficient thoroughly to cover all of the chips. This usually requires one-half to three-quarters of a gallon per square yard. Coarse sand, if available, should then be spread upon the road, or finely screened gravel may be used; if neither are available, then the stone chips. There is no objection to the stone chips if the stone from which the chips are made is a hard variety of rock, but it is better to use some other kind of chips than from limestone. After the surface has been sanded or chipped just sufficient to prevent the wheels of the roller from sticking, the road should be rolled. The roller should be provided with pipes with small orifices an inch or two apart, so as to keep the wheels of the roller wet while rolling. If this is done, there will be no difficulty whatever with the binder sticking to the roller wheels. The rolling should continue until the surface is seen to be well set and compacted. It will then perhaps be found that there are some spots needing further treatment to bring them to a uniform appearance with the remainder of the road, in which case, if there be any dust, it should be swept away, a few chips, binder and sand applied and the whole rolled to give a uniform surface. It is probable that quite as good or better results can be obtained after the road has been sanded and rolled, to throw it open and let the traffic develop any places in the road that need further attention.

This form of construction, it will be seen, gives a road which has the strength and rigidity of the ordinary macadam, with a water-tight covering of bituminous compound holding the surface of the road intact against the action of motor traffic or dislodgment by the mud that adheres to the wagon wheels. So long as the waterproof covering can be maintained, the road should be in perfect condition, and, therefore, the only maintenance required in this construction is to keep this bituminous covering intact. The chips or sand, whichever may be used, with which the covering is mixed, furnishes the resistance to abrasion. This is greatly helped by the binder, if of proper quality, which will tend to keep the particles covered or imbedded as fast as they may become loosened or broken by the traffic. When in the course of time the surface has become sufficiently worn to expose the stone making up the wearing course, it can be renewed by thoroughly cleaning the road, putting on a light application of the binder and renewing the chips or sand. From present observation there is every indication that such a form of maintenance will be possible at a comparatively small expense and furnish, in the meantime, a character of road surface that is well adapted,

as any so far devised, to the ordinary traffic conditions on our main highways at present.

It is evident in this form of construction that the character of the bituminous binder plays no small part and that to be successful the binder must have sufficient stability in hot weather that it will not be easily pressed or displaced and cause an uneven road surface; nor at the same time must it become so brittle or hard in winter that it will be broken by the traffic and dislodged by the wind or other forces. To say that such a binder has been found would mean that most of the difficulties in this form of construction had been solved. Some binders have certain qualities that give good results under certain conditions and poor under others. Some binders more nearly meet the requirements than others, but there has not been sufficient time elapsed with this form of construction, and in the use of these different binders to state definitely what, in the long run, will prove to be the best. While we might draw a conclusion as to which binder was best, further experience might show that some other binder, with somewhat different properties, would have greater durability.

There are two general classes of bituminous binders—those produced from the coal tars and those produced from asphaltic oils and natural asphalt, one being a coal-tar bitumen, and the other asphaltic. Much study has been devoted to both the chemical and physical properties of the various coal tars and coal-tar compounds and the result of the various compounds in road construction observed, to the end that definite specifications could be drawn from which the compounds should be manufactured. The same is also true of the asphaltic binders. While the variety of compounds of a bituminous nature on the market to-day is equalled only by the variety of breakfast foods, there is, however, one very encouraging fact, and that is there are very few of the binders that have come under the writer's observation that are absolute failures, while with the majority, very good results have been obtained. He has found, however, that it is absolutely essential, if any knowledge whatever is to be had concerning the character of the bitumen used, that it be bought under some definite specification, and that it be tested before being applied to the road; that trade names are no criterion as to the composition and characteristics of a given compound. Doubtless the manufacture of these compounds can in a measure justify or excuse the variability of their products by the fact that they are called upon to fulfill so many various specifications that they might well argue if engineers and road builders are so divided in their opinion as to what is desired and wanted, surely little or no harm could result by furnishing binders of various characteristics, waiting, before standardizing their output, until the chemists and engineers are more nearly in accord as to what should be used. However, the latitude that manufacturers allow themselves in many of these cases is rather greater than most engineers and chemists, who have given the subject careful study, usually desire, and therefore the recommendation is here made that the binders be bought under specifications and be tested to see that the qualities desired have been secured. There is very little or no difficulty to manufacture binders to meet any reasonable specification.

For coal tars the following specification has been used by the Illinois Highway Commission:

Specific gravity at 25 degrees C. shall not be over 1.24.

Free carbon shall not be over 20 per cent. by weight.

The consistency as determined by the Howard & Morse float apparatus at 50 degrees C. should be between 2½ mins. and 3 mins.

The fractional distillation shall result as follows:

To 110 degrees C. not to exceed 2 per cent., with no ammoniacal water.

From 110 degrees C. to 170 degrees C. not to exceed 5 per cent. distillate, of which not more than one-fourth shall be naphthalene when cold. From 170 degrees C. to 270 degrees C. not to exceed 30 per cent., nor less than 20 per cent., of which not over 1-3 shall be solids when cold.

Over 270 degrees C. not less than 50 per cent. by volume of pitch residue to be obtained, which shall be sticky and not greasy or granular in appearance.

When a cylindrical prism of tar 1 centimeter in diameter is maintained at a temperature of 0 degree C. it shall bend into a semi-circle of 2 centimeters in diameter without checking.

For asphalt binders the following specifications are used.

The asphalt shall have a specific gravity not less than 0.97 at 25 degrees C.

The asphalt shall be soluble in cold carbon bisulphide to the extent of at least 98 per cent.

Of the total bitumen not less than 20 per cent. nor more than 25 per cent. shall be insoluble in 86 degrees B. naphtha.

When 20 grams (in a tin dish 2½ inches in diameter, with vertical sides) are maintained at a temperature of 170 degrees C. for 5 hours in a N. Y. testing laboratory oven, the evaporation loss shall not exceed 2 per cent. and the penetration shall not have been decreased more than 25 per cent.

The fixed carbon shall not exceed 12 per cent. by weight.

The penetration as determined with the Dow machine, using a No. 2 needle, 100 gm. weight, 5 sec. time and a temperature of 25 degrees C., shall not be less than 5.0 mm. nor more than 10.0 mm.

The asphalt shall not contain to exceed 2 per cent. by weight of paraffine.

For details as to methods of analysis of bituminus compounds the reader is referred to Bulletin No. 38 of the U. S. Office of Public Roads.

The question as to whether tar or asphalt compounds give better results is one on which the writer cannot at present express an opinion, merely because the experience so far had with these different compounds has not proven sufficiently conclusive to warrant any definite conclusion. Both good results and poor results have been obtained with each of these bituminous materials.

Some engineers are of the opinion that under certain traffic conditions better results are obtained with one class of materials than another; for instance, with a preponderance of motor traffic the opinion seems to be in favor of asphaltic compounds, and with a preponderance of steel tire traffic, that the tar compounds prove the better. However, these conclusions, as far as they have come under the writer's observation, seem to have been drawn chiefly from merely surface treatments of old roads. Nothing that he has observed would seem to indicate that a similar distinction could be made from roads constructed as has been described.

The specifications for bituminous material for the form of construction herein outlined are presented, not so much as being necessarily a criterion, but as a suggestion and guide to those who desire to purchase these materials and use them and who may not have given the subject very extended inquiry. It is entirely possible—in fact, quite probable—that these specifications will be changed and other requirements found necessary as more experience has been gained from the work already done. In general, it has been the plan in the past year or two in the use of these binders, on the work under the supervision of the Illinois Highway Commission, to use on each stretch of road at least two binders and so to distribute them on different jobs that each will be placed in juxtaposition with some other. Thus, with a chance to compare each binder with a large number of other binders, and by observation of each binder under various conditions, it is hoped that reasonably exact conclusions as to their fitness for use in this form of construction may be formed.

COST OF MAINTAINING ASPHALT

Average Costs in Rochester, Buffalo and Brooklyn, N. Y., Covering Sixteen to Twenty Year Periods

IN our issues of January 24 and 31 there appeared articles setting forth a method for determining the time when an asphalt pavement should have its surface renewed throughout in order to secure maximum ultimate economy in maintenance. This was based upon the assumption that the cost of maintaining an asphalt pavement in proper condition continually increased from year to year. If such increase in cost of maintenance is not really experienced, then the theory there outlined is incorrect. As a matter of fact, we have heard it doubted whether there is any such increase, and whether it is ever economical to take up and throw away (or make over for binder) asphalt surface material which has not yet worn through; in other words, whether it is not really more economical to continue patching an asphalt pavement indefinitely, and never resurface it entirely.

We have recently been investigating this question. There are comparatively few cities in the country which have maintained any considerable number of asphalt streets for ten years or more and kept separate records of the annual cost of repairing each of these streets. For our investigation we selected the asphalt streets of Buffalo and Rochester, N. Y., since each of these cities has kept a fairly complete record of more than twenty-five streets over a period of fifteen years or more, and moreover neither city has renewed more than two or three asphalt surfaces during that time.

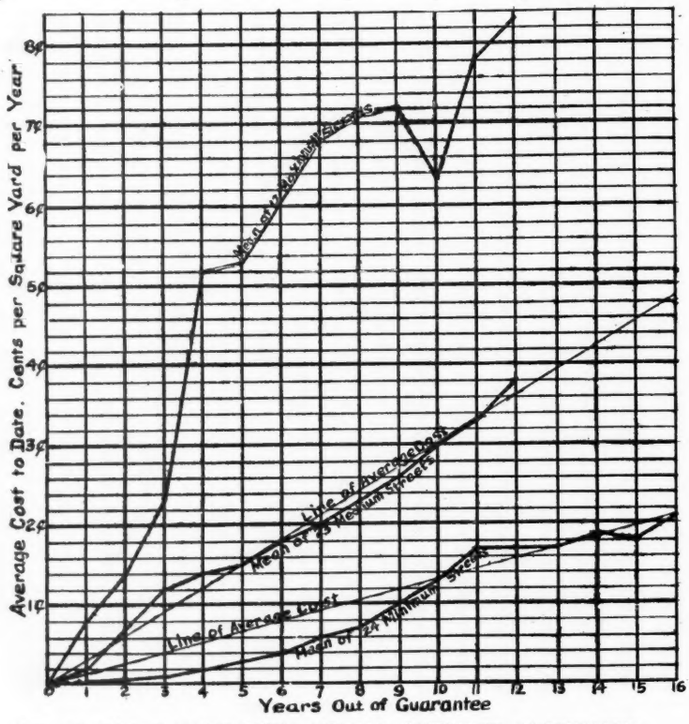
In studying these records we first plotted all of the streets in one city, using the years as one ordinate and the amount spent in that year on the street in question as the other ordinate. We found these lines to be very irregular and so intricately intersecting as to make it difficult to derive any conclusion from them. It seemed desirable to reduce the irregularity of the curves without in any way destroying their accuracy, and for this reason, as well as for the fact that it brought out a somewhat different point, the vertical ordinates were changed from the cost each year to the average annual cost up to the year in question, obtained by dividing the total amount spent to date by the number of years over which the expenditure had been distributed. Thus plotted, the streets seemed to naturally divide themselves more or less distinctly into three classes: those of which the cost was very low, those of which it was very high, and a middle class of medium cost of maintenance.

The next step was to divide the streets of each city into these three groups and find the average cost to date for each year of all the streets in each group. This was done and three curves were plotted for each city, one representing each of these groups. These curves for Buffalo and Rochester are shown herewith. In each city all the pavements used in the calculation were guaranteed for five years, and the years indicated in the diagram are those after the expiration of the guarantee. The actual life of these pavements was therefore five years greater than that shown upon the diagram. There were a few pavements with eight-year and ten-year guarantees, but these were not used in this calculation. A separate study was made of them, but their number was so small that it does not seem wise to attempt to base any conclusions upon them.

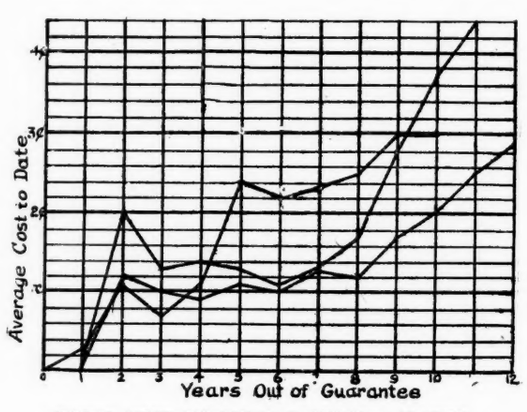
The dotted lines in the Buffalo diagram indicate averages of less than five streets. In each of the curves the number of streets averaged for obtaining the costs for each end are less than those available for obtaining averages for the middle of the curve. In the case of Rochester, however, more than five streets were used throughout all three curves.

In examining the figures and curves it should of course be borne in mind that very few pavements are maintained in perfect condition by the plan theoretically most economical. For instance, most pavements are probably allowed to go without patching a little longer than would be required by theoretical perfect conditions, and in some cases the patching, when it is done, is made a little more extensive than is absolutely required, with the idea of putting in a few extra patches which would be required by next year, anyhow, as long as the plant and gang are on the ground. If we assume a pavement of uniform characteristics and a traffic of the same or of uniformly increasing volume from year to year, we might expect to find the annual cost of maintenance either equal from year to year or uniformly increasing, and if the patching were carried out on a theoretically correct system, the curve of actual costs of maintenance would coincide with a line representing such uniformity or uniform increase in annual costs. For the reasons just stated, however, we might expect to find this curve alternately falling below and rising above the theoretical line.

An examination of the lines of mean annual average costs seems to bear out this idea, and straight lines designated as "lines of average cost" have been drawn in connection with the



AVERAGE COST OF MAINTAINING ASPHALT PAVEMENTS IN ROCHESTER.



THREE MOST IRREGULAR ROCHESTER STREETS.

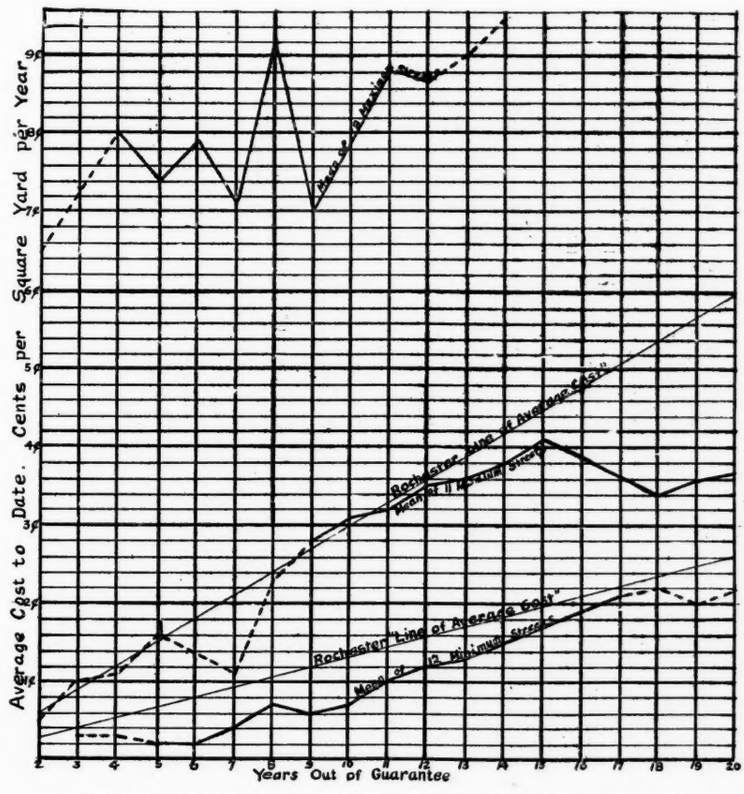
minimum and medium cost streets as giving the probable annual costs of theoretically perfect maintenance. The Buffalo lines are more irregular than those of Rochester, and for this reason, as also to permit of a more ready comparison between costs in the two cities, the Rochester "line of average cost" has been plotted on the Buffalo diagram. In the Rochester diagram it is noticed that in the streets of medium cost the expenditure for maintenance was less than this theoretical average cost for the first year, rose above the line until the third year, after which it gradually decreased to and below the theoretical average cost until the eighth year, when it again rose above it. It is seen, however, that the variation from the line of average cost is comparatively small, the maximum being 0.3 cent. In the case of the streets of minimum cost it would appear that the wear was so slight that many of the streets were not patched at all for six or eight years after the expiration of guarantee, although several of them had more or less repair work done beginning with the third year. By the tenth year the total amount spent had reached the theoretical average cost, passing to 0.2 to 0.3 of a cent above this average in the eleventh year, but from there out the actual average cost agreed very closely with the theoretical line.

It might appear from the line of minimum cost streets that the line of average cost should be a curve concave upward, but the right half of the line indicates that a reverse curve would be necessary, which seems hardly probable, and the explanation offered for the long delay in repairing many of the streets of little wear, and the fact that the medium cost streets give approximately a straight line, seem to indicate that the increase in cost of maintenance is uniform from year to year.

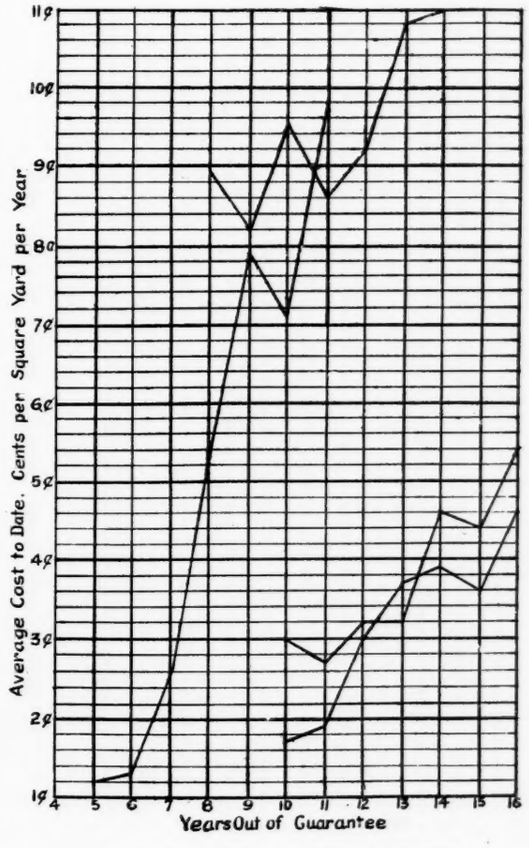
Examining the Buffalo lines we find these considerably more irregular, which may be explained in two ways. In the first place, the number of streets available for compiling Buffalo's record was only about one-half as many as those used in the Rochester study, and consequently the individual irregularities have more effect on the averages. It hardly seems probable, however, that this is sufficient to altogether account for the great irregularity in the case of the medium cost streets, and it is suggested as a probable explanation that the repairing in Buffalo does not as closely approximate the theoretical requirements as in Rochester; that is, streets are allowed to go longer without repairing, and the repairs are then extended over more spots which might have been allowed to go for another year than is the practice in Rochester.

Of the maximum cost streets the number was considerably less in each case than of either of the other classes, and partly for this reason the curves are more irregular. This is not sufficient to account entirely for their irregularity, however, a possible additional cause of this being that the wear on many of these streets was so rapid that it seemed almost impracticable and in some cases hopeless to endeavor to keep them repaired as continuously as is done with the streets of less wear. In the case of the Rochester records it would be possible to draw an approximately straight line of average cost for the maximum cost streets if we can assume either that during the past eight or ten years these streets have been allowed to deteriorate, or that by the beginning of that period all except the very best or least-traffic streets have been eliminated by repaving with other material, and the average cost of maintenance reduced thereby.

In the case of the Buffalo maximum-cost streets we find the line beginning at the fourth year with an average cost of 8 cents per square yard and continuing at a gradually increasing rate, the increase being approximately equal to that of the minimum cost streets, as far as the record extends. We have not sufficient data to do more than theorize upon the cause of this, but suggest the following explanation. These streets are probably those of very heavy traffic, and were so from the beginning of the life of the pavement. As stated above, if a pavement material remained uniform in character and received the same amount of wear continually, the cost of repair would be the same year after year; that is, would be represented


Average Cost to Date. Cents per Square Yard per Year
Years Out of Guarantee
Rochester "Line of Average Cost"
Rochester "Line of Average Cost"

AVERAGE COST OF MAINTAINING ASPHALT PAVEMENTS IN BUFFALO.



FOUR MOST IRREGULAR BUFFALO STREETS.

by a horizontal rather than an inclined line. In the case of these streets the destruction caused by wear of uniform traffic is so much greater than that due to deterioration in the material that the line of average cost approximates the horizontal.

Coming now to actual figures, we find in the case of Rochester that the maintenance of minimum cost streets for any particular year averages approximately .13 of a cent times the number of years since the guarantee expired. For example, in the tenth year out of guarantee the average cost of maintenance of these streets has been 1.3 cents per square yard. In the case of streets of medium cost this annual increment is 0.3 of a cent.; that is, for instance, three cents per square yard during the tenth year out of guarantee. While no straight line of average cost was drawn for the maximum cost streets, if we make the assumption suggested above we would find the annual increment to be approximately one cent per year. That is, the cost per square yard in the tenth year out of guarantee would be about 10 cents.

In the case of the Buffalo streets the annual increment would be somewhat less than the above, that in the case of the minimum cost streets being approximately .11 of a cent per year, and in the case of the medium cost streets .27 of a cent; these figures being about 15 and 10 per cent., respectively, lower than the Rochester figures.

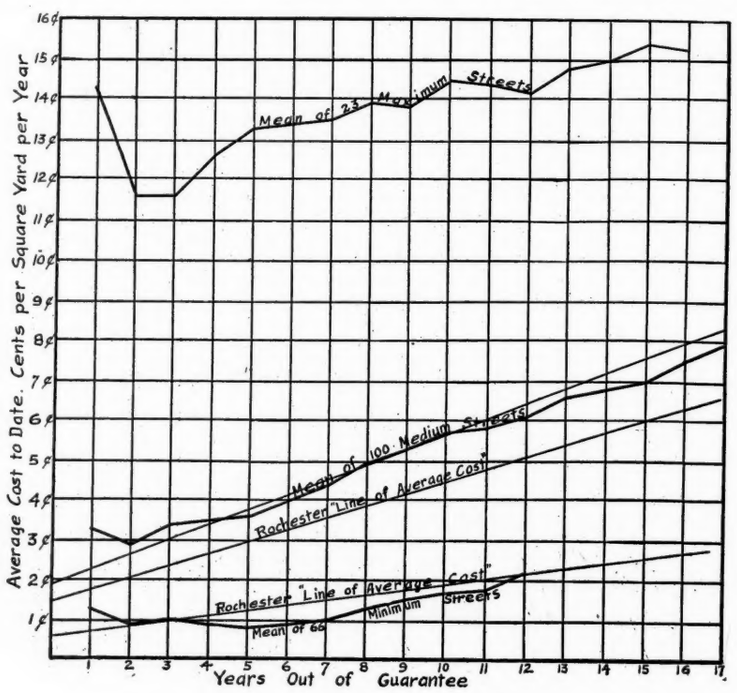
While we had not doubted that the cost of maintenance of asphalt pavements increased from year to year, we were surprised at two of the conclusions which appear almost inevitable in the view of these records. In all the Rochester streets, and in all of the Buffalo ones except the eight of maximum cost, the cost of maintenance begins at zero, while we had anticipated that it would begin at some appreciable point above the zero line, as in the case of the maximum cost Buffalo streets. As to the rate of annual increment of cost, we had expected to find it a curve rather than a straight line, such curve being probably concave upward.

These curves, as stated, are based upon averages of a number of streets, and it might be questioned whether the averaging did not combine irregularities in individual records so inconsistent as to make the average improperly represent any of the individual streets. An inspection of the individual records, however, shows that this is not the case. Two diagrams are given herewith, one showing the three most irregular curves of individual streets in Rochester and the other the four most irregular curves of Buffalo streets. It is seen that there is not one of these in which the annual cost does not tend consistently upward, and considering that these represent the maximum variations, that they agree tolerably well with the curves of average results. Moreover, there were only five streets of those available for this analysis in which the average of the last three years of maintenance was not greater than the average of the first three years. (It is to be remembered that this refers to the "smoothed out" curves formed by using as ordinates the *average* costs to date rather than the actual amount spent each year.) Four of these five streets were among the maximum cost streets, which leaves only one street in the other two classes in which the cost of maintenance has not increased with age.

After analyzing the figures for Rochester and Buffalo, as above explained, we took the records of Brooklyn's asphalt pavements, of which about 300 are out of guarantee, using 189 of these of which the records were sufficiently complete and of sufficient length for our purpose. These also we divided into three groups, as in the case of the other cities. The mean costs were then plotted as before and are shown on the accompanying diagram. Here again we find the minimum cost streets concave at the beginning, the medium cost streets making an approximately straight line—much straighter than in the case of Buffalo, partly because of the greater number of streets averaged; and the line of maximum cost streets the most irregular of the three, and having its general direction approximately parallel to the line of medium cost streets. In these three lines, however, there appear two distinct differences from the Buffalo and Rochester diagrams. One of these is that during the first year out of guarantee the cost of repair was above the line of average cost in each case, and higher than the cost during the second year. Still more notable is the fact that the general direction of the line of medium cost streets cannot by any "fudging" be made to originate at the zero of co-ordinates. Straight lines drawn from the point representing the date of construction rather than the date out of guarantee, however, approximate quite closely to the line of the medium cost streets. In order to make a comparison with the Rochester and Buffalo streets, the Rochester "lines of average cost" are plotted on this diagram, but beginning at the year of construction rather than the year out of guarantee.

But one explanation of these peculiarities occurs to us, namely, that in the cases of Rochester and Buffalo, the streets, when taken over by the city, are practically as good as new and need little or no repairing for two or three years. In the case of the Brooklyn streets, however, it is very apparent that the streets are not in good condition when taken over by the city, since they need extensive repairing the first year out of guarantee, and it seems probable that they by no means as closely approximate the condition of a new pavement as do those constructed in Rochester and Buffalo.

These records appear to demonstrate beyond any doubt that, in these three cities, at least, the cost of maintaining asphalt pavements increases more or less uniformly and indefinitely with the age of the streets, and therefore that Mr. Barlow's theory is based upon a correct premise, and that the time must come with every pavement when it is



AVERAGE COST OF MAINTENANCE IN BROOKLYN.

more economical to replace the entire wearing surface than to continue patching it.

There are, we believe, at least two causes, in many cases three, and in some probably four, all acting to increase the cost of maintaining asphalt pavements. The first two are the gradually decreasing wear-resistance of the original asphalt, and the inferiority of the patches to the original pavement which they are gradually replacing. The third is the increasing amount of traffic carried by most paved streets. The fourth is an inferiority of recent asphalt pavements to those laid a decade ago, which is claimed by some to exist. The cost per square yard actually repaired was not given in either of the records, and it is impossible to say whether this has been increasing or decreasing.

These considerations and Mr. Barlow's theory suggest another direction in which this study could be similarly extended, namely, a comparison of the economy of pavements of different kinds for a given street. The theory referred to enables us to determine the total cost (maintenance, interest, sinking funds, etc.) of any street for any length of life, and similar calculations for brick streets, wood block streets, etc., would enable us to determine which material gives a minimum total cost per year under given kinds of traffic, this cost being the ultimate cost; that is, including the cost of renewals as well as of maintaining the original pavement.

STRATHCONA HYPOCHLORITE PLANT

Emergency Plant Erected in Sixteen Hours—Permanent Plant—Powdering and Seiving Box—Mixing and Storage Tanks—Orifice Box

THE water supply of Strathcona, Alberta, is drawn from wells in the bank of the Saskatchewan River, reinforced with water pumped directly from the river when necessary. During the latter part of 1910 there was an epidemic of typhoid fever in the city, and it was decided to install an emergency sterilizing plant at once. Work was started at 10 a. m., November 28, and the sterilizing solution was turned into the supply at ten minutes past two the following morning, a little over sixteen hours later. This was done at the recommendation of the medical health officer and W. Muir Edwards, and the construction of this emergency plant, and of the permanent plant which succeeded it, was described by the latter in a paper before the Canadian Society of Civil Engineers and may contain suggestions for other towns similarly called upon to install emergency plants.

The materials used were a candy pail, two 50-gallon barrels, two tubs made by sawing the tops from two other barrels and the necessary piping, valves, etc. Commercial bleaching powder, after being pulverized and passed through a sieve, was mixed into a smooth paste in the candy pail. Water was then turned on and the solution allowed to overflow into the barrels, which formed the storage tanks. From these barrels the solution flowed into the overflow tubs through ¾-inch pipes controlled by valves. From these overflow tubs the solution discharged freely through a curved brass tube of ⅛-inch bore. An overflow pipe was placed so that a head of 6½ inches over the orifice was obtained. The orifice tubes delivered the solution into the bell-mouth of a ¾-inch pipe, which delivered the dosing solution at the center of the mouth of the suction pipe of the high-lift pump.

It was found that this method of mixing the solution was unsatisfactory; also that, as the flow from the storage tanks was comparatively small, the valves were constantly becoming choked and at times the flow stopped altogether. The curved tube also was too small, became clogged and was not easily cleaned out. In fact, it was learned that it was necessary to avoid valves, flat grades or angles, all of which are apt to aid the formation of a deposit, thereby interfering with a uniform flow in the pipe.

Soon after this emergency plant had been installed a permanent one was authorized. This consists of a powdering and sieving box; a rising current, conical mixing tank; three reinforced concrete storage tanks; two small boiler feed pumps; drain pipes, water pipes, etc. The powdering and sieving box contains two compartments, the bottom of one being used as a pulverizing surface and on the top

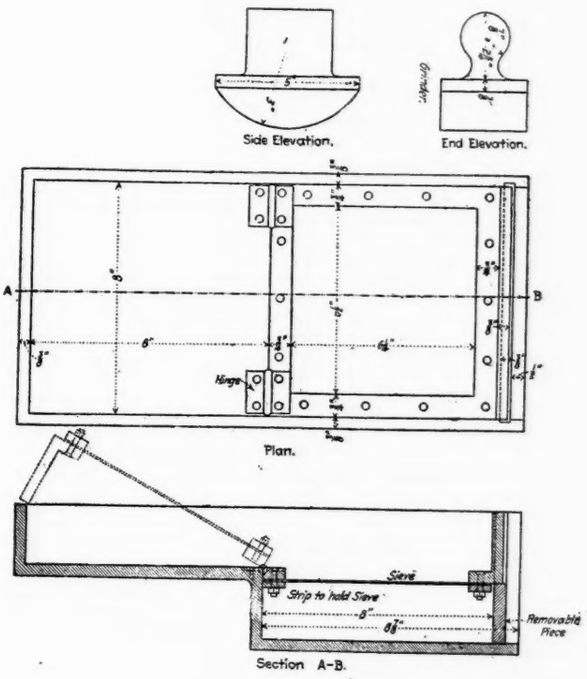


FIG. 1.—POWDERING AND SIEVING BOX.

of the other being a sieve through which the powder passes to the compartment below. The frame work holding the sieve is hinged and can be turned back as shown in the illustration, this returning the unpulverized particles back to the pulverizing surface and also permitting the mixing of the powder into a paste in the compartment below the sieve.

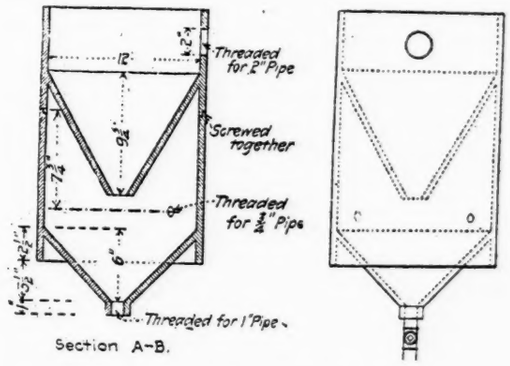


FIG. 2.—HYPOCHLORITE MIXING TANK.

In order to eliminate the inert insoluble matter found in commercial hypochlorite, a mixing tank was designed as shown in Fig. 2. This consists of an outer cone in which the hypochlorite is placed and into the side of which two feed water pipes are led and from the bottom of which a

drain pipe removes the waste portion of the powder. Screwed into this cone, and co-axial with it, is a second cone having a one-inch opening at the bottom and a diameter of 12 inches at the top. When the drain pipe at the bottom of the lower cone is closed and the feed water turned on, water rises into the upper cone through the one-inch opening. Near the top of this upper cone a two-inch pipe is connected to receive the overflow and conduct it to the storage tanks, a connection being provided in this pipe through which a strong flow of water may be added to the hypochlorite solution and pass with it into the storage tanks. The discharge of water into the lower cone can be regulated so as to carry out as much or as little of the insoluble portion of the bleaching powder as is desired. After the tanks have been filled the valve in the drain pipe is opened and all the insoluble material not carried over in the overflow is washed into the drain. This contrivance the author believed to be original.

There are three storage tanks of reinforced concrete, circular, 3 ft. 8 in. in internal diameter and 5 ft. 8 in. deep, with 5-inch walls. The suction pipe of the pump is suspended two inches from the bottom of each tank, a two-inch drain pipe is inserted level with the bottom, a two-inch overflow pipe removes the unused solution from the orifice box and discharges it at the top of the tank, and opposite this overflow pipe a two-inch pipe enters the top of the tank, which is connected with the conical mixing tank. The withdrawal of the solution from the bottom of the tank and the return of the surplus at the top is relied upon to maintain a uniform strength of solution.

A small boiler feed pump having a capacity of five gallons per minute raises the solution from the tanks to an orifice box, which is used to provide a steady, uniform dosing of the solution into the raw water. This box is 15 in. by 30 in., inside dimensions, and is constructed of reinforced concrete three inches thick. A constant head is maintained by the overflow pipes referred to. An adjustable feed is secured by two brass plates faced and held with their faces in contact by means of a spring. In the inner plate are 3-16, 3-8 and 7-16-inch holes, suitably spaced on a circumference described about the pin connecting the two plates, around which pin the inner plate revolves. The rotation of the inner plate brings the desired hole opposite a ⅝-inch hole in the outer plate. This contrivance thus gives three rates of flow. Screwed into the hole in the outer brass plate is a curved brass tube, through which the solution which passes through the orifice flows to the bell-mouth of a ¾-inch pipe, which delivers it to the pump suction. The ¾-inch pipe is set with a continuous slope and curved lengths instead of elbows. The solution is mixed with the raw water during its passage through the pump.

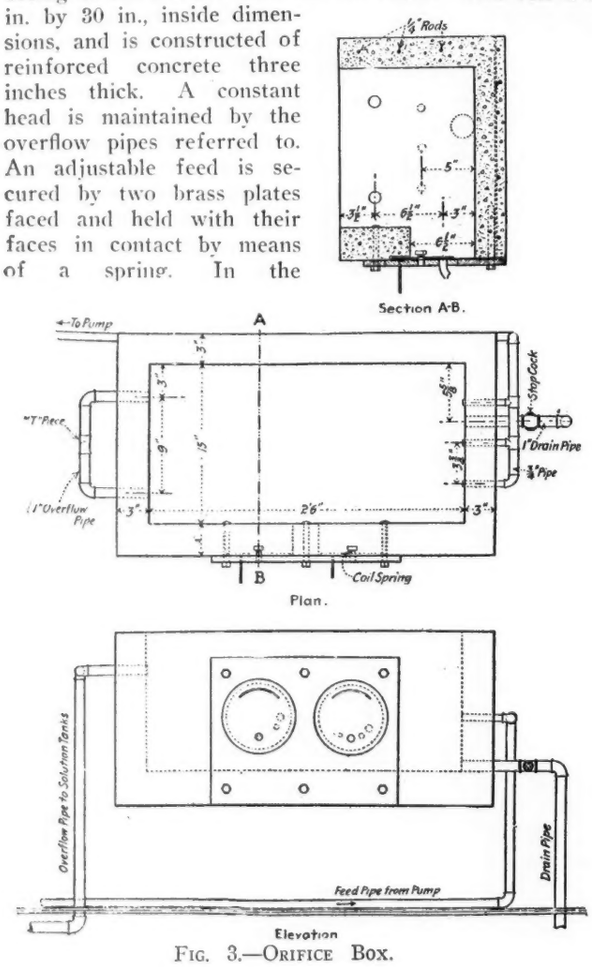


Fig. 3.—Orifice Box.

As far as possible the necessity for careful oversight was eliminated. The three storage tanks hold a supply of the solution sufficient for a 24-hour run. It is especially necessary that the hypochlorite be properly sieved and mixed before being placed in the rising current mixer, but sufficient for one dose can be prepared thoroughly in five minutes. Floats indicate the level of the solution in the tanks and any stoppage would result in an overflow, which would be noticed at once. Twenty to twenty-five minutes are required each shift for filling the storage tanks, after which the entire plant should be self-operating.

FIRE ALARM BOXES FOR SAN FRANCISCO

The city of San Francisco, Cal., has a complete system of fire alarm boxes, all of which up to a few months ago were Gamewell boxes. For several reasons, among them the fact that repair parts for these boxes had to be obtained from the East, thus leaving the box out of commission for a long time whenever it needed even minor repairs, the city officials decided to determine whether it would not be possible for the city to manufacture its own boxes. William H. Urmy, Chief of the Department of Electricity, following along lines of experiments conducted by his predecessors, worked out a system whereby he claims to have entirely eliminated the danger of the non-recording of an alarm which is sent after an alarm from a nearby box in the same series has begun to ring. "Instead of placing a lot of boxes in one vicinity on one series or wire," said Mr. Urmy, "we take groups of four boxes in the same vicinity and place them on separate circuits, creating what is called the interlacing circuit system.

"Under this system, if two boxes within a block of each other are rung in, both are recorded as they work along separate circuits instead of through a single series. Furthermore, it was discovered that highly complicated alarm boxes were no longer needed, as all of the dependence which formerly was placed in their delicate mechanism could now be placed in the interlacing circuit system.

"Of course we were forced to use a great deal more overhead and underground wire in order to perfect the interlacing circuit system, but we made up for this extra cost in wire by the reduced cost of boxes and equipment. We make our own boxes, and the first lot turned out cost but $78, as against the $125 charged by the Eastern company."

At present San Francisco has 400 miles of overhead fire alarm system wire and from five to six miles of underground conduit Instead of having delicate mechanism to transfer to the station houses alarms received at the central fire station one man at the central station attends to this, and Chief Urmy reports that since this system was installed they have not had a single case of alarm box interference. All the work of constructing the boxes is done in the city shops, which can at any time furnish repair parts on very short notice.

The Department of Electricity also makes its own police alarm boxes at a cost nearly 25 per cent. less than that charged by the regular manufacturers.

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FEBRUARY 1, 1912.

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Preserve Your Journals

WE are continually receiving inquiries from subscribers for information to which we are able to reply by referring the writers to previous issues of the MUNICIPAL JOURNAL, there being few subjects of interest to municipal officials of any kind which we do not touch upon at greater or less length during the year. It is very probable that there are a number of our readers who will find nothing in this issue of immediate interest to them, and yet it may be only a few weeks or months before every one of them will be greatly interested in obtaining just the information which is contained in some one or other of these articles. For instance, we received a day or two ago a request for information concerning public comfort stations, and referred the inquirer to seven different descriptions of such stations which had appeared in MUNICIPAL JOURNAL during the past two years.

The interests of municipal officials are most widely varied, and we could not possibly confine within the limits of one or two issues matter bearing upon subjects of immediate concern to all of our readers. And yet probably none of these can be certain that some one of the articles in any given issue will not at some future time furnish him information which he will then greatly desire. Some of the matter contained each week has the nature of news of temporary interest only; but to obtain the full value of MUNICIPAL JOURNAL the copies should, even at the busiest time, be at least opened each week and glanced through in order that the general nature of the articles may be ascertained; and the numbers should then be preserved and bound for reference; and later, when it is desired to design a public comfort station or a sewage disposal plant, improve a street or look up a legal decision, the bound volumes with their indexes will furnish numerous items of information on the subject which could not otherwise be obtained except by extensive investigation, if at all. Back numbers are difficult and some of them impossible to secure.

Repair and Renewal of Pavements

Editor THE MUNICIPAL JOURNAL,
50 Union Square, New York.

SIR—The article by Mr. Barlow on "Repair and Renewal of Pavements," printed in the JOURNAL of January 18, is interesting, but liable to be quite misleading. His conclusions seem to be predicated upon the assumption that the renewed pavement will be of the same quality, will cost the same, will have the same life, and that the cost of repairs and other conditions will be the same as developed by the old pavement. This will hardly ever be even approximately true.

The problem of determining even theoretically when a sheet asphalt pavement should be renewed is complicated and difficult, partly because so many of the factors are undetermined and must be assumed. It is, of course, obvious that when the annual cost of keeping up an old pavement becomes greater than the annual cost of a new pavement, it should be renewed. The practical problem is to determine when that point is reached, and this must be largely a question of good judgment in each individual case. S. WHINERY.

New York, January 22, 1912.

The above letter was referred to Mr. Barlow and his reply is as follows:

January 25, 1912.

Editor THE MUNICIPAL JOURNAL,
50 Union Square, New York City.

DEAR SIR—Mr. Whinery's letter of January 22 brings up some points which probably were not made clear in my article on the "Economic Repair and Renewal of Pavements," referred to.

The cycle considered to be the life of the surfacing started with the concrete foundation ready for the surfacing—it included, of course, the period during which the surfacing was in use and ended with that surfacing taken up and removed, leaving the foundation, as at the start, ready for another surfacing. Thus all the data used would be the actual known data during this cycle for the particular surfacing under consideration and would not in any case be assumptions.

Thus the net cost on which the sinking fund was based was the actual for this particular surfacing, the only assumption necessary in practice being the very minor one of the net cost of removing. There were several reasons for using this original cost rather than an estimated replacement cost, the principal one being that, I think, it is financially sound, e.g., if there has been a material drop in the price of the surfacing and a fund is created based on renewal rather than on the original cost, then the difference between the two represents a shrinkage in assets, which ought not to exist. The logical way to care for this is to create a sinking fund based on the original cost, then when the surfacing is worn out the entire capital invested in that particular surfacing will be still intact.

The underlying principle of the article was that if the pavement was removed at the time indicated, basing this on the actual known data for the particular pavement under discussion, then the city would have had the use of that pavement during its life at a minimum cost per year. Each surfacing laid on the one foundation this becomes an entirely separate problem. Very truly yours,

J. E. BARLOW.

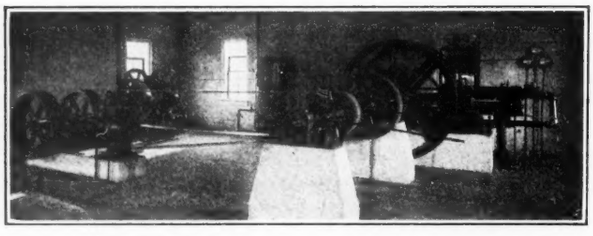
MUNICIPAL IMPROVEMENTS AT ELMORE

The village of Elmore, Ohio, has a population of only about 1,000, but has shown itself to be more progressive and better supplied with public improvements than many cities of much larger size. About two miles of the streets are paved, and a sewer system totals more than five miles in length and more than one-third of the residences are connected to it. The town also has a municipal electric light plant and a semi-municipal water system. Some years ago an effort was made to bond the city to construct water works, but this was voted down by the citizens,

ELMORE PUMPING STATION AND TANK.

and following this the council granted a franchise to the National Company of South Bend, Ind., to construct a water works plant and lease it to the village. An injunction was sought to restrain the council from operating the plant under a lease, but its right to do so was sustained by the Supreme Court and the plant is now being leased from the constructing company and operated by the village.

More recently the voters almost unanimously consented to bonding the village for an electric light plant, and this plant has now been completed. Current is not generated by the village, but is purchased from the Toledo, Port Clinton and Lakeside Railway and distributed by it.



INTERIOR OF PUMPING STATION.

The village is unusually small to be provided with all these improvements, but the illustrations show that the pumping plant and building, water tank, etc., are of creditable neatness, design and substantial construction.

PORTLAND CEMENT SPECIFICATIONS

In the spring of 1911 the Secretary of the Department of Commerce and Labor endeavored to bring about an agreement between the several departments of the Government on a uniform specification for Portland cement. At present the specifications of the several departments and bureaus which use this material are lacking in uniformity. The result of this conference was the appointment of a committee to recommend such uniform specifications, which committee adopted a tentative set of specifications which was accepted by the departmental conference on July 20. It was then decided to confer with national engineering organizations which are interested in cement specifications to secure the adoption, if possible, of a single standard specification for general use throughout the United States. Eight hundred copies of the tentative specifications were distributed to representative engineers, testing laboratories and members of cement committees of various societies for suggestion and criticism. The cement committees of the Board of Engineering Officers of the United States Army, the American Society of Civil Engineers, the American Society for Testing Materials and the American Railway Engineering Association were invited to a general conference to be held in the fall. All expressed their willingness to attend such a conference to be held November 24 at Washington, but at that time there were present no representatives of the American Society for Testing Materials, and several of the members of the Committee on Uniform Tests of Cement of the American Society of Civil Engineers were unable to be present. Such as attended, however, discussed in detail the tentative specifications, together with suggestions and criticisms which had resulted from the distribution of the eight hundred copies. A general agreement was reached by those present and the specifications thus revised were submitted for consideration to the committees of the various organizations.

A second joint meeting was held on January 8 of this year, at which representatives of the committee of the American Society of Civil Engineers were present. Substantial agreement had already been reached upon all points involved except upon the method of determining normal consistency and time of setting. At this meeting the representatives of the American Society of Civil Engineers expressed preference for retaining the Vicat needle for both these tests, but offered in compromise to accept the Ball method for determining normal consistency if the Government representatives would accept the Vicat needle instead of the Gillmore needle for determining time of setting. The Government representatives considered this proposition at some length, but were convinced that the Gillmore needles should be used because they considered them much simpler in operation than the Vicat needle, much less expensive and simpler of construction, equally satisfactory in result when used by a less skilled operator than the Vicat needle requires, and preferred by the majority of testing laboratories as a means of determining time of setting; moreover, the Gillmore needles do not require as large a sample and do not necessitate a special testpiece as with the Vicat needle, and they consider the two methods to be equally accurate. They therefore reported adversely to the Vicat needle, and the specifications as agreed upon in all other points, but calling for the use of the Gillmore needles, are recommended by the Government officials for adoption as the U. S. Government specification for Portland cement.

NEWS OF THE MUNICIPALITIES

Current Subjects of General Interest, Under Consideration by City Councils and Department Heads—Streets, Water Works, Lighting and Sanitary Matters—Fire and Police Items—Government and Finance

ROADS AND PAVEMENTS

Surveyor Reports on County Road Work

St. Paul, Minn.—In 1911 there was constructed in Ramsey County 5 miles of macadam, 4.21 miles of clay and gravel, and two miles of graded roads, making a total of 11.13 miles added to the good roads system of the county, according to the annual report of County Surveyor Armstrong to the county commissioners. The price for these improvements was $51,104.80; amount allowed, $32,418.71. For lake improvement there was spent in the year $4,031.93; for miscellaneous, road and bridge fund, $5,626.24; fencing, $43.28; upkeep of roads, $10,500. There was received from contractors for use of county road rollers $1,110.

No Good Roads for Kenosha

Kenosha, Wis.—The new State law for the building of permanent highways will not be called into effect to bring the improvement of the Lake Shore Road through Kenosha County, one of the worst roads in the State from the standpoint of automobile drivers. The road was included in the county highway system, but town boards have declined to make any provision for its improvement this year.

Consider Purchasing Municipal Asphalt Plant

Schenectady, N. Y.—Among the matters now being given consideration by the Board of Estimate and Apportionment in making up the budget for this year is that of the purchase of a municipal asphalt plant to be used by the city for making repairs, and also for resurfacing work. The administration figures that by doing the work under municipal direction that the plant can be purchased this year on the savings alone in repair of streets and in this way at the end of the year the city will own the plant and have made the repairs at no less cost than that of last year. It is the intention of the administration to purchase a $15,000 plant that will be movable so that it can be taken wherever it is needed. The plant will be of sufficient capacity to take care of the resurfacing work for the city also and this will mean an additional saving, but the cost of the plant will be saved, so it is expected, entirely out of the repair work. The question of purchasing asphalt is one that is not bothering the officials, who assert that this material can be had in any quantity needed by the city. The proposition to purchase the plant is one that has been promoted in particular by Commissioner of Public Works Mullen, who is well informed on paving matters. Commissioner Mullen has given the matter of municipal paving plants considerable attention. He estimates that a plant such as the city will purchase will have a capacity of 1,000 square yards of resurfacing a day.

City Asphalt Plant Reduces Cost of Maintenance

Spokane, Wash.—The first annual report of Spokane's latest municipal venture—the new asphalt plant built by Mayor Pratt and put in operation for the first time by the commission form of government—shows that Spokane pavements can be maintained at less than half the former charge of contractors. The report, made public by Commissioner Coates, shows that for $10,254.56 the city during 1911 did street paving repairing which contractors wanted $23,500 to do. When the asphalt plant was started in operation by Commissioner Coates contracts existed with paving companies to maintain the city's pavements during 1911 for $23,500. These were canceled by the city and the maintenance done by day labor by the new asphalt plant for $10,254.56, a saving of $13,245.44, or 56.4 per cent. The work has been under the direction of F. M. Hiatt, foreman for Coates. The report shows further that, including work done for property owners and the street car companies, a total of $44,235 worth of asphalt work was done on an original appropriation of $28,500. This was possible by reason of receipts amounting to $17,049 received by the department. The sum of $1,414.18 remains in the treasury of the department at the end of the first year's operations.

Will Spend $40,000 on County Roads

Kansas City, Kans.—Wyandotte County will spend more than $40,000 for macadamizing roads in the county this year. Nine thousand dollars of that amount will be spent in preparing the Leavenworth roadbed so the Leavenworth-Kansas City, Kans., road can be finished by the convicts. The commissioners will grade the road and furnish the stone with which it will be macadamized. The commissioners also will spend $27,000 for the work on the Muncie Bonner Spring road. That amount will cover the cost of macadamizing the road between Muncie and Edwardsville, three and one-half miles. Contracts for this work also will be awarded soon. What other money is spent will be for macadamizing the Reidy road. The commissioners intend to start macadamizing the road at Indian Springs, a mile west of the city limits, and continue the work as far as the money will last. They intend eventually to macadamize the road to the end.

Paving Contract Finished

Palatka, Fla.—In a few days the present contract for paving the streets with vitrified brick will have been completed. The finishing touches are being given the job on the unimproved block extending northward on Eleventh street from Orange to Main. This done, Palatka will have to her credit more miles of hard thoroughfares, it is said, to her population than any city in the entire South. Practically all the principal business and lateral streets, including numbers of residential streets, are hard-surfaced with brick, in widths varying from 16 to 24 feet for the latter and the regulation width for the former. It is learned that another similar proposition to do more paving will at an early date be formulated and submitted to the people for ratification or rejection. If it is done and ratified by the citizens another $50,000 worth of vitrified brick streets will be put down, increasing the grand total to an amount in the vicinity of $250,000, and the mileage to something like 20 miles.

Must Have Permits to Dig Trenches

Nashville, Tenn.—An order was issued by the Board of Public Works in regard to the issuing of permits for the digging of trenches in the city streets. According to the new ruling of the board all contractors who seek permission to dig a trench for the laying of pipe or any other reason must secure a permit. This permit will cost $3 for the digging of a trench of 10 feet or less and an additional 25 cents for every additional foot. The order was made to defray the expense to the city in case the ditches are not properly filled, in many cases ditches, apparently well filled, falling below the street level after a short time. The order does not affect cases where paving is torn up, nor does it allow contractors to leave the trenches unfilled, a special clause in the order calling attention to the fact that the ditches must be refilled to the street level and tamped, as required by city ordinance.

Asphaltic Oil to Offset Auto Wear

Portland, Ore.—Because the macadam roads of the county are showing wear from the heavy automobile traffic, Road Supervisor H. B. Chapman gives the problem considerable attention in his annual report and recommends that heavy blanket treatment with asphaltic oil be tried as an experiment. The County Court has given him permission to try the experiment. In his annual report Supervisor Chapman says the county has expended $225,357.78 for road construction and maintenance during 1911. The county has between 500 and 600 miles of roadway, 90 per cent. of which has been graded, but much is yet to be done in the way of widening and reducing grades. More than 24 miles of new macadam have been constructed during the year, 10 miles resurfaced and 900 feet of old bridges replaced by permanent fills. The Supervisor recommends the replacing of the 300-foot span bridge across the Sandy River at Troutdale with a steel structure and asks for three more county quarries.

SEWERAGE AND SANITATION

Gas in Sewer Explodes

Wilmington, Del.—Two boys were injured and several others had narrow escapes when gas exploded in a sewer at Vandever avenue and Buena Vista street. The boys were standing over the manhole and it is thought some one dropped a match or a cigarette into the sewer. The manhole cover was blown off.

Five Miles of Sewer Completed

Muskogee, Okla.—Nearly five miles of the Coody Creek sewer has been completed. The Parker-Washington Company, which had the contract for the construction of two miles of the sewer, has asked the council for final estimates on their part of the work. These will be made after Commissioner Fleming and City Engineer Clonts have gone over the work and made their final inspection. Other contractors have about three miles of sewer laid.

Street Commissioner Discovers Cause of Clogging

Bay City, Mich.—Street Commissioner Augustus Elias recently sent the following communication to the Common Council: "In the few months that I have been in office I find that some expense to the city could be obviated; for instance, in the uncovering of lateral sewers I find that in a majority of cases those sewers are being clogged up with gravel and refuse from roofs which are directly connected with such laterals by pipes from eave troughings. I would recommend that practice of connecting eaves troughs in said manner be discontinued. Also that the ordinance with reference to the cleaning of sidewalks of snow and ice be so amended as to compel property owners to remove the snow and ice from walks which cover space between buildings and the gutter line and place such refuse at least two feet from the gutter line. In addition that the sweepings from stores be deposited in receptacles furnished for such purpose by the property owners or by the city, instead of having sweepings thrown into the street, as appears to be the common practice at the present time in this city. The work of flushing sewers has been increasing steadily, but has been much retarded this past season because of the fact that said department is not supplied with modern sewer rods and the horse which is being used at present for the purpose of carrying hose and necessary tools for the flusher is old and of little value in said department. I would suggest that said horse be replaced by a younger one and that the comptroller be authorized to purchase sufficient number of modern sewer rods.

Would Keep Health Record of Children

Schenectady, N. Y.—The inaugural message of Mayor George R. Lunn, after stating that his administration intended to go as deeply into the question of health as the city's power and resources permit, says: "The administration proposes to establish a system of records which shall give details as to the health of the individual child from birth to the wage-earning period A maternity and infancy nurse, trained also as a social worker, will be appointed. It will be her duty to teach the expectant mother the proper hygiene of the lying-in period, the care of her infant, to watch and report upon the health of the child until the time of its entrance into school. In the public school rigid inspection by qualified physicians will begin—cases of illness and deficiency will not only be reported, but will be followed up by nurses. The record of the child which began at birth will be continued at the school. Then when the time to begin work comes and the child applies at the Health Department for a certificate, its record will be returned to that department. In this way the health of the future citizen will not only be kept constantly under guard by the city, but a mass of data will be compiled which should prove useful to students of social science, as well as to all Socialists who will use these facts to protest against child exploitation.

Ocean City's Good Sewage System

Ocean City, N. J.—The great intercepting sewer main extending along West avenue from Third to Sixteenth street has just been completed at a cost of $75,000. When the new sewage disposal plant is in operation, in the early spring, it is said the city will have the best-equipped system of any of the State's seashore resorts.

Special Rate for Irregular and Rectangular Houses

Baltimore, Md.—President John Hubert of the Second Branch City Council has prepared an amendment to the sewerage tax bill drafted by City Solicitor Field, providing that the Board of Estimates shall have full power to fix a special rate for "irregular or rectangular shaped houses," when occupied as dwellings, if in the opinion of the board members the front foot rate would not be a fair charge for the use of the sewers. Mr. Hubert explained that many houses in the suburbs were built in rectangular form, and it would not be fair to charge such property owners a sewer tax according to the front foot rate. A similar provision is inserted in the act creating the water tax.

Sewage Killing Fish

Norristown, Pa.—Testimony was heard in court in an action brought by the State of Pennsylvania against George B. Hurdle, superintendent of the Ehret Magnesia and Asbestos Company, of Port Kennedy. It is charged by the State that the company discharges from its plant into the Schuylkill River water in which there is sufficient deleterious substance as to kill fish and fish food. Charles H. Genman, a fish warden, declared that he experimented with samples of water taken from the river at the point where the discharge enters from the plant, and fish placed in it immediately showed signs of distress. White particles collected on their gills, then the whole body became white and the fish were suffocated."

WATER SUPPLY

Superintendent Makes Annual Report

Springfield, O.—Superintendent George Cotter of the waterworks department of the city has prepared his annual report, covering the year ending December 31, 1911. The new method of accounting was provided by the State Board of Uniform Accounting. Superintendent Cotter, in his report, calls attention to the great amount of work during the last year, particularly the transferring of an additional force of men from the pumping station to the distribution system. Now there is a greater volume in case of serious fire, and also an uninterrupted supply. Superintendent Cotter makes a number of important recommendations, among which are that the price of meters be reduced to the actual cost to the city plus the freight charge; that the price of ferrules and curb boxes be reduced to actual cost, plus freight; that the cost of street and lawn sprinkling be reduced; that the city adopt the meter system to apply to all services where there are sewer connections from fixtures; that a rule be adopted to provide that where a new addition is being laid out and water main extensions are desired that a contract be provided between the water department and parties owning the plant to bear all expenses of the installation and that as soon as the extension pays 6 per cent. the waterworks department would take the mains at the original cost. An interesting array of facts and figures gives the comparative cost of operating and maintaining the department together with statement of business from 1903 to and including 1911. The cost has been greatly decreased. This shows it is possible to operate a municipal plant successfully and without an increase in cost. The average cost is about $26,000. In 1903 the cost was $36,000 and in 1911 the cost was $30,876.41. In 1910, however, the cost was $26,337.17. The increase in 1911 was due to a new ruling of city council, as a result of which the cost of maintenance and operation was $4,000 more than in the previous year and also in the past three years. This was due to the fact that council ordered that all services should be carried to curb and at all lots abutting on streets that were being permanently improved. This, together with having to lower two main lines on streets where grades were being changed, was the reason for the additional cost. In 1903 there were 5,194 services and 1,080,535,750 gallons were pumped as against 8,209 services and 2,089,183,562 gallons pumped in 1911. This means that while the city served 36 per cent. more customers and pumped 47 per cent. more water in 1911 than 1903, the operating cost was $5,123.95 less.

Broken Main Causes Water Famine

Madison, N. J.—By the bursting of a 12-inch water main on Main street the borough has not only experienced a water famine, but much damage has been done to stock in cellars, which were flooded. To add to the seriousness of the situation there was no water in the standpipe. Morristown was appealed to by Chief Gruver to lend assistance to Madison in case a fire should break out. The steamers would be of no value in the absence of a water supply, but it was figured that the chemical engine might be of service. It is in the business section of the borough where the greatest damage was done. Much stock in cellars of business houses along Main street has been practically ruined.

Municipal Waterworks Make Money

Alexandria, Ind.—Alexandria's municipal water plant made a considerable sum above the actual expenses, to be applied on waterworks bonds during the year 1911. The report of the waterworks committee shows that the total earnings of the plant for the year were $10,614.35, and the operating expense amounted to $5,698.64, leaving a balance to the good of $4,942.17.

Cold Weather Causes Water Famine

East Liverpool, Ohio.—Continued cold has cost a near water famine in this and nearby cities. More than 100,000 gallons more are being pumped as the result of the custom of keeping open the pipes and spigots to prevent freezing. Chief Engineer Edward C. Cox of the East Liverpool waterworks department announced that for the past week they have been pumping on an average of 3,500,000 gallons of water every 24 hours, over 1,000,000 gallons more than the average amount. From Wellsville comes a like statement. Frank Smith, chief engineer of the Wellsville water works, states that at the present time they, too, are pumping almost 1,000,000 more gallons of water each 24 hours than has been their wont. In Lisbon the question of sufficient water supply has gained alarming proportion. For two weeks there has been no water in the city reservoir, and the supply has been pumped directly into the water mains. The largest consumers have been cut off entirely, and the water pressure is so low that those in the higher districts are being slighted.

Water Plant in Danger of Collapsing

Sacramento, Cal.—In a recent report to the Board, Dr. G. C. Simmons, City Trustee, warned the Board that immediate attention should be given the water works, that the pumping plant is antiquated; that the building is in danger of crashing in, and that the fire menace is great. The danger to the plant comes principally from the plant building. The west wall is about ready to fall in and the roof is not secure. If they fall, the steam pipes leading from the boilers to the engines would be snapped and the city's water supply instantly cut off.

Superintendent of Waterworks Comments On Waste

Muncie, Ind.—As the result of persons allowing their hydrants and water faucets to run during the day and night to keep them from freezing the water supply of Muncie is now in a critical condition. The enormous waste of water was called to the attention of the Board of Public Safety by Quince Walling, superintendent of the Muncie Waterworks Company. Mr. Walling appeared before the board and explained the conditions and said what would be the result should a large fire break out in the city that would necessitate the use of an unusual amount of water. The visit of Mr. Walling before the board resulted in that body's issuing the following notice: "On account of the consumers allowing their hydrants and water faucets to run during the present cold weather to prevent them from freezing, the fire service of the city has been badly crippled, and unless such waste of water is discontinued legal proceedings will be instituted against parties practicing the same." According to statistics submitted by Superintendent Walling to the board, over 30,000,000 gallons of water were pumped by the waterworks company in one week. Superintendent Walling says the supply of water used by the average consumer is about 50 to 60 gallons per day, while the present supply being consumed shows each consumer to be using nearly 1,000 gallons a day. "If a large fire should break out in the city now we would be unable to cope with it," said Chief Casey.

Clogging of Vacuum Pump Shuts Off Water Supply

Schenectady, N. Y.—The city of Schenectady within the past few days found itself without a water supply for five hours. During this period the pumps at the station in Rotterdam were idle and not a single gallon of water was forced into the city's mains. The trouble was due to clogging of a valve in the vacuum pump at the station, the centrifugal pumps being unable to pick the water from the wells, because of air in the intake pipes.

Reservoir Bursts, Flooding Valley.

San Diego, Cal.—One of the high pressure gates leading from the old town reservoir, one of the principal reservoirs of the city's water system, burst one day last week and more than one million gallons of water poured out of the enclosure into Mission Valley, carrying everything before it until it finally found its way into False Bay. No property of any value was in the path of the flood, though it was reported that several head of stock perished. The reservoir was badly damaged. It is the belief of the city officials that the flood gate was opened with intent to wreck the reservoir.

British Water For Maine Town

Calais, Me.—Calais formerly drew its water supply from the St. Croix River at the little town of Milltown, some distance above the city, but the quality of the water at the intake became contaminated by the waste poured into the river 12 miles above, where are situated huge wood pulp and paper plants. Various fresh sources of a pure and sufficient supply were sought for without success, there being none in United States territory near enough to Calais to be available. Just at this time the Canadian city of St. Stephens decided to install a municipal water system and tapped a great spring of pure water that seemed to be inexhaustible. One rainless summer, when no drop of rain fell for five months, this spring furnished 2,000,000 gallons of water daily, and the Calais folk across the river in Uncle Sam's territory looked upon their Canadian neighbors with envious eyes. The temptation proved too great and a deal was made with a newly organized company to take water from across the Canadian border and deliver it into the pipes of the United States city of Calais. So ever since British water has flowed into this municipality, and it is the only water that the city has for drinking, manufacturing or fire protection.

New Engine Installed

Cairo, Ill.—The costly new engine for the Cairo Water Company is being installed at the pump house by a special representative of the Allis-Chalmers Company. The engine is valued at about $25,000. Superintendent Gannon declared the pump should be in operation about the first of next month. The new engine is said to be the best of its kind in any city this size in the country.

Large Pumps Assist Comacho Reservoir to Supply Demand

Empire, Panama.—An increase in the population of the section served by the Comacho reservoir water system, and a probable shortage in the amount of water stored on account of the early beginning of the dry season, have made it necessary to provide for pumping water from the Chagres River to supplement the reservoir supply. Two large centrifugal pumps will be mounted on the south channel pier of the railroad bridge at Gamboa, and will pump into the main at that point. These pumps are rated to deliver the equivalent of 1,500 gallons of water per minute each against a head of 150 pounds. They would, therefore, be capable of delivering over 3,000,000 gallons a day. The territory served from the Comacho system extends from Bas Obispo to West Culebra, inclusive, and includes besides three villages the marine camp, the camp of the tenth infantry, a part of Culebra cut with its steam shovels and locomotives, and the dumps on the relocation of the Panama railroad north of Gamboa. Last year the average consumption was 2,000,000 gallons a day from the reservoir and, in addition, about 1,500,000 gallons pumped into the mains. At present the daily consumption runs about 2,500,000 gallons from the Camacho reservoir and pumping station. Camacho reservoir has a capacity of 313,367,000 gallons, and at the close of December it was about 88,000,000 gallons short of the supply stored at that time last year. The flow of water into the reservoir is so small at present that it does not make up for the evaporation.

Uses Nearly Six Hundred Gallons Per Capita

Tonawanda, N. Y.—The annual report filed with the city clerk shows that the department is in excellent financial condition. The department had $19,650.39 cash on hand at the beginning of the year after expending a total of $17,580.46 during 1911. The waterworks pumped during last year nearly 2,000,000,000 gallons of water for domestic use, or a daily per capita consumption of 566 gallons. In furnishing the city with water, 1,458 tons of coal were consumed. The department installed 82 water services during the year and constructed 2,500 feet of new water mains.

Relation of Metered Services to Water Consumption Shown

New Orleans, La.—Superintendent George G. Earl in his December report regarding the Sewerage and Water Department states: "The average amount of water purified daily in the month was 15,087,000 gallons for the main part of the city and 633,000 for Algiers. The total average water consumption at the end of 1911 is still below 16,000,000 gallons per day, with practically 30,000 meters in service. In March, 1909, with only 9,000 services metered, the water consumption was 16,000,000 gallons per day. In September, 1909, with 13,400 services, 30 per cent. metered, it was 20,000,000 gallons per day. By March, 1910, with 16,400 services, 75 per cent. metered, it had fallen for the first time since March, 1909, to 16,000,000 gallons, and since March, 1910, for a period of nearly two years, it has stayed between 14,000,000 and 16,000,000 gallons while the unmetered services were being metered, and while the total number of services were nearly doubled. The complete metering of all connections, which was completed at the end of 1910, has been the first cause of this good record, and the co-operation of the free consumers in waste prevention during 1911 is the next cause. Even now less than half of the water pumped is paid for, the other portion being used through fire hydrants, by the public and charitable institutions, which get their water free, by pay consumers as free water for sewerage uses, by under-registration through meters and by leakage from mains, etc."

Frozen Pipes Cause Water Famine

Idaho Springs, Colo.—With two water supply pipe lines, three storage reservoirs, and a water system that represents $70,000 bonded indebtedness, Idaho Springs citizens awakened to the fact that there was no water in the reservoirs and the supply in the mains of the city so small that those living in the upper part of the city had to carry water for domestic purposes. There are two sources of water supply, one from Soda Creek and one from Chicago Creek. The former is the weaker of the two and is still running, but the supply is meager for the domestic needs of a city of 2,500 inhabitants, and in the event of a fire the result would be a calamity. The ice in the reservoirs lies on the bottom, and only by exercising the utmost saving is any water available for the homes. The other source of supply is from Chicago Creek, the main line, and which is four miles long. This line of pipe is frozen solid its entire length, and for the past day or two the emergency boiler has been in commission and attempts made to thaw the ice. Men have been put to work along the line to determine the extent of the freezing and in the hopes of finding places where by the injection of steam the condition can be remedied. H. O. Walker, of this city, who for years had charge of the water system, says the situation is the gravest in the history of the city and that it is doubtful if the ice will be overcome before spring. This means a menace to the existence of Idaho Springs in the case of a serious fire. Walker states that by the expenditure of only $15 last week the freezing could have been prevented. It was known at that time that the water supply was getting low and that there was need of something being done. For such emergencies a boiler was placed up Chicago Creek some years ago, under the superintendence of Charles A. Bradstetter, then superintendent of the waterworks, to inject steam in the running water, thereby melting the slush ice. Why it was not used on this occasion is not explained. Already citizens are having water hauled to their residences, and only a long warm spell would relieve the situation by increasing the Soda Creek supply.

STREET LIGHTING AND POWER

Wire Subways for City

York, Pa.—Ordinances providing the first step toward getting wires in this city under ground have been approved by the Highway committee of City Council. They authorize the York and Bell Telephone companies to construct conduits under the highways for their lines, stipulating, however, that room be provided for the city's fire alarm and police telegraph systems, and that each company give the city ten free telephones perpetually.

New Electric Light Plant

Central City, Ia.—The new electric lighting plant of this place opened with a big banquet. It will furnish power to this city, Center Point and Walker. Mayor E. S. Wetherby presided and a number of speeches were made. The new dam on the Wapsie river furnishes power to the plant.

City to Trim Lamps for Convention Week

Baltimore, Md.—Baltimore's new system of ornamental lamps and lighting, which has been under consideration by Mayor Preston, Superintendent McCuen of lamps and lighting and the Architectural Commission for months, will be in working order by the time the Democratic National Convention meets in Baltimore in June. The Mayor will confer with Mr. McCuen and George A. Miller, of New York, a lighting expert in regard to the new system. Mr. Miller was in charge of the installation of the general scheme of lighting for Atlanta, Minneapolis, Richmond and other American cities. He recommends for Baltimore's parks comparatively small, graceful cast-iron standards, using underground wires, and a dignified spacing of the posts. He suggested the establishment in Baltimore during the next few months of a real great White Way. This is meant for Baltimore street. For this thoroughfare he suggests the use of single units of light, employing a globe which hides the glare. These should be spaced approximately 14½ feet above the sidewalk on cast-iron posts of special and suitable ornamental design, with a lineal spacing of 150 feet and an alternate spacing of 75 feet. This, Mr. Miller says, gives both ornamentation and good light.

City Abandons Municipal Plant

Payson, Utah—Payson is to receive its electric lights and power from the government line, which comes across the valley from the Strawberry Valley plant, at the mouth of Spanish Fork canyon. The line passes through Salem and extends through the whole valley under the irrigation project, going as far as Utah Iake, where pumping stations for pumping the water up into the dry land are contemplated by the government. By securing the light and power from the government plant, Payson is giving up the municipal plant which it has owned and operated for many years, but which is now inadequate to meet the increased demands for light and power.

Hold Unfavorable Views On Municipal Ownership

Schenectady, N. Y.—Municipal operation of public service corporations in this State, so far as the up-State Public Service Commission has observed it, meets with little favor from the commission. The commission calls attention to the conduct of municipal lighting plants, which were operated in two cities and forty-eight villages of the State. It is stated that such municipal plants are, with a few commendable exceptions, unable or unwilling to adopt practices of modern accounting and in many instances the bookkeeping is limited to a record of consumers' accounts and simple statement of receipts and disbursements with little or no attempt at analysis or classification. In some cases the affairs of the lighting plants are so inter-related to those of water or some other department and the accounts of the two departments are so confused that it is impossible to determine the actual results of the operation of either department. The commission remarks that it is a matter of supreme importance, when municipalities embark upon business enterprises, that they should adopt businesslike methods. The citizens of many a village are convinced that their lighting service is cheap when as a matter of fact it is dear, because the lack of a proper accounting system fails to reveal the actual conditions.

Ordinance to Regulate Wiring

Fort Worth, Tex.—An ordinance has been ordered drawn by the city authorities providing for improved methods for electric wiring inside of buildings, to insure greater safety against fires from electric currents. The proposed ordinance has been approved by the City Electrician and Fire Chief and provides all interior wiring for the use of electricity for light and power, hereafter installed within the fire limits, shall be in approved metal conduit, armored conductor, metallic flexible conduit or approved metal molding. The provisions will entirely prevent wiring by amateurs.

Superintendent's Report On Municipal Plant

Auburn, Ind.—Superintendent Sam Davenport has given out some interesting figures pertaining to the city's electric light and water works plant. The receipts from current during 1911 were $15,682.83, and from water service $5,441.51. Other receipts bring up the total to $22,973.62. The net operating expense was $11,672.11. Last year the plant was practically rebuilt, entailing an outlay of $22,466.31, making the total disbursements $34,138.42.

Municipal Light Plant at Galion, O., a Great Success

Galion, O.—That this city has one of the most economically managed municipal electric light plants in Ohio is evidenced by the report of the State Examiner. The report shows the plant in addition to being self-sustaining has net earnings of over $5,000 a year, despite that street lighting is placed at the low rate of $55 a year. In recent years more than $10,000 has been paid for betterments, all outstanding bonds have been retired, and there is a surplus of $6,500 which will be expended in providing street lamps of latest design.

Town Makes Money From Light Plant

Thurmont, Md.—Two years ago the principal citizens of Thurmont wishing for better illumination of the streets than that furnished by kerosene lamps, formed a company incorporated under the laws of the state as the Citizen's Electric & Power Company, and money being advanced a plant was started. The understanding between the town and the citizens backing the company was that as soon as the legislature passed an act empowering the city to float bonds for the construction of a lighting plant the town would take it off their hands. The enabling act was passed and an election held, a bond issue of $18,000 was floated, and before the plant was completed it was turned over to the town. Public interest was put to the test, however, when it was found that the plant would cost a small amount in excess of the money gained by the bond issue. Then the citizens demonstrated their interest by subscribing among themselves the excess amount. George A. Farley was retained to superintend the work of installing the motive power and the power house. The plant was built to use the waters of Hunting creek, which rises in the mountains, eight miles from Thurmont. The stream flows from the Catoctin Mountains and through the town and its flow is strong and rapid. Mr. Farley's plans called for the erection of the power house in the central part of the town, while the dam was to be located on the mountain 4,000 feet above. From the dam to the power house water for the turbines was taken in wooden pipes. Some were laid in trenches, while sections of the line were of solid rock and protected by rock laid over them. In the town at the end of the 4,000 feet of the wooden pipe line, a power house was built. It is of concrete with slate roof, and in it are turbines, generators and switchboards from which the light giving current is sent to the streets and into the homes and public buildings of Thurmont. The lights were turned on July 1, 1910, for the first time. The town hall, in which the alumni of the High school were holding a celebration, had been equipped with new electric light, and the Mayor, William Freeze, turned on the lights there thus putting elecricity into commission. Since the opening of the plant the city has extended its operations to lighting residences, stores, halls, churches, lodge rooms and other places. The revenue gained from the sale of current will soon be large enough to pay all expenses of the plant. In addition Thurmont gets its street lighting absolutely free of cost.

Will Reduce Price of Current for Power

Bay City, Mich.—The electric light committee of the council have decided to reduce the cost of electricity to the big users—those who take the current for power purposes—one-half cent per kilowatt. Mayor Woodruff and the members of the committee were also in favor of giving the smaller users—residence lighting—the benefit of a reduction, but the matter was finally laid over until the next meeting. The desire to reduce the prices is due largely to the fact that the city electric light plant has been making money. The municipal ownership idea is based on the proposition of giving cheap service. The net profits of the city's plant so far this year, it is reported by Superintendent Fitzhugh, have reached $20,000, and by the end of the fiscal year, according to the report of Superintendent W. H. Fitzhugh, the amount will be swelled to more than $27,000. It is the sentiment of the committee that the private consumer should get the benefit of this handsome profit.

Gas Inspector Submits Report

Louisville, Ky.—Gas Inspector John Vreeland has submitted his annual report to Mayor W. O. Head. The report shows that the maximum candle-power of the gas supply during 1911 was 19.66, the minimum 16.81 and the average 18 candle-power. Sixteen is the candle-power required by law. During the year 5,547 meters were inspected, 3,436 more than in the preceding year. Of the meters inspected 5,098 were new, and 120 of the meters were rejected by the Gas Inspector. Forty-nine of the meters averaged 5 1-5 per cent. fast and 71 of them averaged 7 2-5 per cent. slow. One meter was found to be 55 per cent. slow, while another was doing its best to make up the loss to the gas company by being 10 per cent. fast. Of all the meters inspected 5,027 belonged to the Kentucky Fuel Gas Co. The pressure during the year was satisfactory. Sulphur and ammonia were discovered in the gas, but in less quantities than the maximum allowed by law. No sulphuretted hydrogen, another impurity, was found upon analysis.

FIRE AND POLICE

Auto Patrol Gives Satisfaction

Columbia, S. C.—W. C. Cathcart, chief of police of the city of Columbia, has submitted his annual report for the year 1911. The department has done a large amount of work during the year. Mr. Cathcart asks that the city erect a new station house, as the present building is entirely too small. The automobile patrol wagon, according to the report, has given entire satisfaction.

Want Fire Line Ordinance Passed

Birmingham, Ala.—At a number of recent fires in Birmingham the firemen have been hampered by the fact that the city has no fire line ordinance. Chief of Police George H. Bodeker said: "I think the fire line should be established and I always try to maintain something akin to it when a serious fire breaks out. Even if a man runs past our improvised fire line now, we can do nothing but bring him back. We cannot arrest him for a repeated offense, for there is no law covering it. If there was a law to cover the situation, I will guarantee that the police department would do its part toward rigidly maintaining a strict fire line." P. O. Hebert, Southern States Manager for the Eureka Fire Hose Co., with headquarters in Atlanta, was in the city. He said: "A fire line should be in vogue in every city. There is no doubt of it. Without the fire line, there are scores of self appointed chiefs of the fire department and the nation is now in great danger of its sidewalk committees who seem to know more about doing things than a man who is experienced in his line by about twenty-five years' work. I have seen how things go at first where there are fire lines and in cities where there are no fire lines, and I find every time that the amount of damage is proportionately less where the fire line is maintained than in cities where there is no law covering this evil. The firemen of the city are also in favor of the fire line, and they stated that they would deem it a personal favor should the city commission pass an ordinance requiring the establishment of a fire line.

Board of Safety To Have Better Checking System

Fort Wayne, Ind.—With a view to effecting a more businesslike and, therefore, more economical administration of the affairs of the fire department than has been possible in the past, the Board of Safety has adopted a new checking system in handling the supplies for the various houses. Several thousand dollars are spent annually in keeping the houses supplied with the various small articles the city furnishes. In the future each house captain will be required to file a requisition with the clerk of the Board of Safety and, obtaining an O. K. on it, will then be required to go to the storeroom at No. 1 station and obtain his goods. At the end of the year the filled requisitions plus the invoice of goods on hand in the storeroom must tally with the amount purchased. Not only will this scheme prevent waste, but also it will enable the board to save considerable money through purchasing supplies in wholesale consignments. "We'll save a good portion of our salaries right in the fire department," one of the board members declared. Invoices are being furnished at present from each of the houses showing the value of every article on hand belonging to the city, and when these are completed the board will have first-hand, accurate knowledge of just what is under its control and a succeeding board will be correspondingly benefited by it. The Council will be urged to construct a new machine shop at No. 1 station so that all repairs to fire equipment may be made at a minimum cost to the city. The larger-sized engines cannot be taken into the present shop. A new instrument house also will be asked for, as the one at No. 1 station has been condemned by the fire underwriters as having been placed entirely too close to the haymows.

Want Uniform Fire Hose Connection

Logansport, Ind.—Pending action by the Legislature to make all fire hose connections uniform throughout the State, a movement is now on foot among cities in northern Indiana to unify the size of connections. The need for this was brought to mind when an appeal was sent to the Logansport Fire Department asking assistance in fighting a fire at the Cash lumber yard at Kokomo. Fire Chief John Griffin stated that he had no connection to fit the Kokomo fire plugs, but said that he would send a company, anyway. The engine was being loaded on a special train on the Panhandle when another message came stating that the fire was under control. Investigation revealed the fact that the Kokomo Fire Department has a Logansport connection, to be used by Kokomo firemen if they are ever called to this city to help fight a fire, but Logansport has no Kokomo connection. Logansport has connections from Peru, Lafayette and Marion, and if any one of these towns send a fire company here the hose wagon will not remain idle. A committee from the fire departments of several cities of northern Indiana will draft a bill for presentation to the Indiana Legislature asking the passage of a law making fire plug connections uniform throughout the State.

Albanian Invents Fire Alarm Device

Albany, N. Y.—William B. Martin, superintendent of the Albany Fire Alarm Bureau, has applied for a patent on a telephone device which he has invented for street fire alarm boxes. Martin's invention will do away with the antiquated systems of dots, dashes and bells, as far as fire chiefs are concerned when sending a second, third or general alarm. Martin's system will be installed in Albany soon. Martin has been experimenting on his idea for weeks. After convincing himself that the plan was practical he laid the matter before Chief Bridgeford. The invention, which can be attached to the regular mechanisms of the street fire boxes, was placed in a box in one of the outlying sections and put to a real working test. The fire chief carries a talking set in his pocket, this is inserted in the fire box, and with it when a second alarm is desired, the chief notifies the operator at headquarters. The Martin system is a great time saver. Under the present method the chief to send in a second alarm from the fire box must use the Morse code of taps. He slowly taps in nine times and is forced to wait until the operator at headquarters returns the nine taps, in order to be sure that the message has been understood. Under the new plan an alarm can be turned in while the chief is talking, without interfering with his conversation over the wire.

Red Arc Lights Indicate Alarm Boxes

Fort Wayne, Ind.—The Board of Public Works has secured a couple of samples of arc light globes, with red bands, to indicate the location of fire boxes and will turn them over to the Board of Public Safety for action. The safety department has been considering asking that the arc lamp at each corner where a fire box is located be equipped with one of these colored globes, so that citizens may know just where they can find an alarm box in case of fire. It is a system satisfactorily employed in a number of cities

Company Will Manufacture Novel Fire Alarm Systems

Syracuse, N. Y.—Wilbur M. Waite, of this city, has organized the Waite-Tayden Company, with a capitalization of $10,000, to manufacture and market the Waite emergency alarm system for schools and factories, which he invented and perfected. The patent has been granted on the factory alarm device and a patent has been applied for on the system for the schools. The system for the schools makes it possible to instantly discover a fire in the building without causing a fright among the pupils. The same instant a notice of its location is transmitted to every teacher in the building simultaneously. In this system expansion thermostats are placed in out-of-the-way corners, closets and stairways and emergency annunciators are placed in the class rooms. On each annunciator is an electric whistle, used in preference to bell gongs because it is musical and avoids producing a nervous shock on the children. The fire causes an expansion of the nearby thermostat and this sends an electric current through the rheostat in the principal's office and thence to the emergency annunciators in each class room. With this system the principal is able to sound test or drill alarms exactly as they would be sounded in a case of fire and send them in from any part of the building. When alarms are sounded under Mr. Waite's system the same children do not always go out the same exit as at present. In this way the danger of a panic is greatly lessened because the pupils would not be frightened by having escape from any one doorway cut off. The device for the factory is a combination of emergency alarms, fire warden and a watchman of the watchman.

Fire Record During 1911.

Norfolk, Va.—The Board of Control has made public the following report of Fire Chief McLaughlin for the year 1911, the figures showing the department to have made a brilliant record. During the year the department was called upon to respond to 481 alarms, which as compared to the previous year was a decrease of four alarms. The fires for the year are classified as follows:

Brick, stone or iron buildings	131
Frame buildings	180
Other fires in buildings	66
Assistance rendered out of city	9
False alarms	95
Total	481

Number of fires confined to buildings or place of origin	366
Number of fires extending to adjoining buildings	9
Number of fires extending beyond adjoining buildings	2
Assistance rendered out of city	9
False alarms	95
Total	481

Value of buildings	$3,297,994
Value of contents	1,943,455
Total	$5,241,449

Insurance on buildings	$1,881,772
Insurance on contents	1,005,342
Estimated insurance on property at risk	$2,887,114

Damage to buildings	$45,499
Damage to contents	73,598
Estimated damage to property at risk	119,097
Damage to buildings and contents where fire originated	102,403
Damage to buildings and contents where fire did not originate	16,694
Total	$119,097

AUTO APPARATUS NOTES

Remarkable Endurance Test of Auto-Pumping Engine in Actual Service—Motors Would Reduce Syracuse Expenses by Half—Two Converted Engines Received in Paterson

Richmond, Va.—A recent fire in this city furnished a strong arguement in favor of the superiority of the modern motor-driven fire apparatus over the old type. For thirteen hours a big Knox Pumping engine kept two streams going on the fire practically without intermission and within a few minutes after it returned to headquarters it was ready for another call. During the entire time the engine was working, from just before 6 p. m. until it was ordered back to quarters by Chief Joynes at 7 a. m. the chauffeur, who was also engineer and mechanician, occasionly poured a bucket of gasoline into the tank and went over his machine with an oil can. The steam fire engines at work during the same period each required two men in attendance, an engineer and a fireman. Their total consumption of fuel was more than twenty-five tons of steam coal. The bill for running the gasoline pump at full speed for thirteen hours came to $4.50. A few minutes after seven o'clock the engine backed into its house, had its tanks filled, its parts oiled, and the driver reported it ready for duty. This is the longest period for pumping in actual service so far recorded of any gasoline pumping engine. The nearest approach to it was in a lumber fire in St. Louis about six months ago when a Webb engine pumped over eight hours.

Anderson, S. C.—In order to modernize its already well equipped fire department the city council of Anderson has placed an order for an American-LaFrance automobile fire truck costing $5,500. The council has been considering the advisability of purchasing a combination hose, chemical and ladder auto truck for several weeks, and during this time a special committee of that body has visited Columbia, Florence and Greenville with a view of ascertaining the best make of fire trucks to buy. The order for the machines was placed after representatives of several machines had submitted bids and explanations of their respective machines. The motor truck is to be delivered within sixty days, and will be used to supplement the fire-fighting apparatus already in use. A small portion of the apparatus now in use, including a hose wagon and two or three horses will be disposed of. The fire department will retain a hose and chemical wagon, drawn by horses, and a ladder and hook truck drawn by horses.

Norwich, Conn.—After having had it under consideration for many months, in fact since they took office in June, the Board of Fire Commissioners, following careful investigation, have contracted for a piece of motor-driven fire apparatus for this city, definite details concerning which have been completed and the auto chemical and hose wagon will be here by the agreement by the first of March. The auto combination wagon is exactly the same as the one that was on exhibition at the recent New York auto show. Many extras were given by the company as requested by the Board of Commissioners and Chief Stanton has been to Hartford several times regarding the specifications and details. The alterations on the Norwich car and the added equipment were secured to meet the local requirements. At the request of the designer Chief Stanton made a number of suggestions which were adopted. The board and chief made many trips at personal expense in deciding upon the car. The car has a wheel base of 139 inches, the tread being 56 inches. The wheels, which are demountable, are 38x5½ inches, equipped with pneumatic tires, the rear tires being 39x6 and the front 38x5½. Single instead of dual tires were considered much better for the requirements. It is a four cylinder 50 horse-power car as rated by the A. L. A. M. formula, but will develop 70 horsepower; water cooled with a planetic radiator of the Pope Hartford make, there being oil-tight and dust-proof aluminum and cases for the mechanical parts. It is shaft driven with dual ignition, and equipped with a Bosch megneto. The car is built with sufficient power for all the hills. It is geared so as to give four changes of speed, three ahead and one reverse, the ratio being 4 to 1. The controlling levers are on top of the steering wheel, and all gear changes are made by one lever located near the driver. The radiator has a capacity of five gallons. The body of the car is figured to carry 1,000 feet of hose, having a board running lengthwise of the body, so that the 3½-inch hose will be carried on one side and the 2½-inch hose on the other. There are 250 feet of chemical hose also. There will be room for six men to sit on seats arranged over the mud guards and room on the rear running board for others, it being calculated that it will carry eight to ten men. As to the chemical equipment, the auto is equipped with one tank of the Champion style, containing 40 gallons, while extra acid jars and soda bags are carried so that by renewing 120 gallons of chemical can be used. There are also three-gallon Underwriters tanks on each side of the auto.

The machine will be equipped with quite a complement of ladders, there being a 17-foot extension ladder, which will reach 25 feet, while in addition there will be a 12-foot roof ladder and a 14-foot baby extension ladder for inside work. There will also be the necessary axes, crowbars, pike poles, door openers and four firemen's lanterns. On the dash will be located a large searchlight of the Rushmore make, with an automatic lighting equipment. The basket back of the driver's seat will hold the ¾-inch hose, the brass rail at the back of the basket being for the boots of the men, while there is another rail for their rubber coats. The bunker boxes at the rear of the driver's seat are something new and very convenient, while on each running board will be a box for light tools. There will be a grip handle on the rear and projecting from the end of the center board. The chemical tank as seen in the picture is located under the driver's seat. A prestolite tank with necessary tools, jack with oil and prestolite lamps at front and side. On the front end is a bumper with springs, while the equipment also includes a combination speedometer and clock. A locomotive bell will be mounted on the same fixture which holds the searchlight. There will be chains for the wheels for bad weather, and when the department receives the machine it will be equipped to take care of all fires, whether the hills are icy or not. The machine will be painted a dark English vermillion, with gold stripes and Norwich Fire Department on the ends of the driver's seat.

Paterson, N. J.—The converted automobile fire engines, Nos. 1 and 5, have been given a tryout and showed what they were capable of doing. No. 1 was the first to be given a run, and when it was part way up Park avenue trouble was experienced with a pipe leading to the radiator. This had frozen up and broken open when shipped, and for that reason the machine did not run well. But that was such a minor thing, since it can be repaired easily, that it was not considered seriously by Bernard H. Wilkinson, the sales agent, who gave the machine the trial spin. When the engines first arrived here they were partially dismantled, cups and like appurtenances having been taken off before they were shipped.

Charlotte, S. C.—The Knox Company has recently been given an order to furnish the fire department with a Knox auto fire truck. The Knox truck weighs 7,500 pounds and will carry all the men who can pile on it. It has a horsepower of 48 American or 70 French. The machine will have a speed of 40 miles an hour. Its wheel base will be 128 inches with a tread of 60. Solid rubber tires or cushion tires will be 5½ by 5½.

Syracuse, N. Y.—Chief John P. Quigley, of the fire department, in discussing the superiority of automobile apparatus over horses in the winter time, made the statement that the money being spent this winter for calks on the shoes of the horses in the fire department would more than pay for all the gasoline and oil that would be used if every piece of apparatus in the department was motor-driven. Chief Quigley said that if the people of Syracuse could realize the sacrifice in horseflesh that was made every winter in the department, this city would have more motor apparatus. The chief's car is the only automobile in the department now and this is the second winter it has been used. "When the horses on the trucks and the assistant

chief's wagon can hardly stand, I can answer an alarm without the least difficulty, no matter how deep the snow or how icy the roads may be," said Chief Quigley. "Last year I used two chains on my rear wheels, but this year I am using a non-skidding device on one wheel only, and it is sufficient. I can go anywhere at a speed of from 25 to 40 miles an hour, about ten times faster than any horse or pair of horses we have in the department." Chief Quigley expressed the opinion that it would not be many years before every piece of fire apparatus in the city will be either motor-drawn or motor-propelled, and that the present cost of maintaining the department would be cut down at least one-third, if not one-half. Chief Quigley said if he was given permission to buy motor apparatus the first cars he would order would be a combination wagon and a gasoline tractor. The combination wagon would carry hose, chemical engine, short ladders, extinguishers and other apparatus. The tractor he would use for one of the fire engines and also for a heavy hook and ladder truck which is used little because it is almost too much to ask three horses to pull it. A gasoline tractor, the chief believes, would be a valuable asset because it could be used to pull a number of pieces of apparatus to a fire almost as quickly as a pair of horses could pull one truck. The tractor referred to by the chief is a frame supporting a motor and transmission machinery, geared to the rear wheels, with a third wheel in front for steering. The wheels are equipped with solid tires. This tractor can be attached to any kind of a wagon, truck or vehicle in a few seconds, and is especially adaptable to long ladder trucks, because it makes it possible to swing long apparatus in a narrow street easily.

Columbia, S. C.—The chief of the fire department at Columbia, in his annual report, said: "The self-propelled fire-fighting machines have been in use for six months and in that length of time economy to the department and quicker response to alarms have been the results as commented on in the report. The cost of upkeep was surprisingly small: Chief's automobile, $151.06; motor engine, $62.80, and the combination machine, $70.75. Continuing the comparison between the self-propelled machines and the horse-drawn apparatus, the report shows that by the use of the more modern methods there have been displaced an engine, two hose wagons, four drivers and their salaries, horse feed, fuel and repairs, making an actual saving of $245.30 a month since the adoption of the new machines."

GOVERNMENT AND FINANCE

Ashland to Have Commission Election

Ashland, Wis.—Ashland will vote upon the question as to whether the commission form of government will be adopted or not on February 6. Mayor Dodd filed his proclamation with City Clerk Morris, announcing that a special election for this purpose can be held on this date.

To Vote on Commission Plan

Menomonie, Wis.—Menomonie will on January 29 vote on the question as to whether the commission form of government shall be adopted for this city.

Klamath Falls to Have a New Charter

Klamath Falls, Ore.—On account of dissatisfaction with the Klamath City Charter by the bond buyers, paving contractors and other parties transacting business with the city council, it has been decided to have a new charter providing for a commission plan of city government. City Attorney H. M. Manning, with a committee of councilmen, was instructed to prepare the instrument and submit it to the council within a month. It will be voted on by the people in May. The Sacramento and charters of other cities providing for commissions are to be used as models.

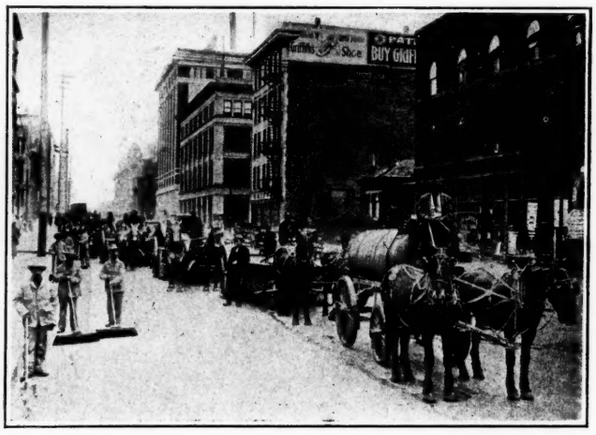
Oaxaca Town Unable to Pay Municipal Employes

Mexico City, Mex.—The city employes of Tehuantepec, Oaxaca, are very much concerned over the failure of the authorities to pay them their salaries and have threatened to leave their positions and to prevent other men from filling them unless the proper settlement is made at once. The local light and power company has also threatened to embargo the sources of revenue of the city for the payment of the street lighting bill which the city owes to the company since May, 1911.

STREET CLEANING AND REFUSE DISPOSAL

Street Cleaning in Denver

Denver, Col.—The total expense of keeping Denver's streets free from dirt during 1911, according to the annual report of the department, was $124,585.87. The cleaning of



CREW OF DENVER'S STREET CLEANERS.

the streets and alleys cost but a fraction over 58 cents for each inhabitant. The illustration shows one of the crews of the street cleaning department as they line up for sweeping an asphalt street, with a sprinkler and four machines.

Junior League to Help Keep City Clean

Boston, Mass.—Definite steps were taken to form a junior municipal league when Mrs. T. J. Bowlker, president of the Woman's Municipal League of Boston, addressed 200 girls at the South Bay Union on "What the Girls Can Do to Keep the City Clean." Mrs. Bowlker emphasized the point of individual responsibility, saying, "If you want a clean city, first of all don't put anything dirty into it yourself; don't throw papers or rubbish into the streets and alleys, and ask for covers for garbage cans so that rubbish and papers cannot be blown about before collecting day. Refuse to buy in markets and candy shops where the things are not kept covered and off the floors. Don't buy milk which doesn't come bottled." It was decided to form a junior league, having departments for streets and alleys, markets, housing, play and a special department which should work to keep walks free from banana peels.

Cleaning Up Dallas By Districts

Dallas, Tex.—Dallas has commenced the cleaning up process by districts, and in District No. 1 there were used twenty-five wagons most of the time, some of them holding as much as seven cubic yards of trash. From this district, beginning January 10 and leaving off January 12, some 2,000 cubic yards of trash were handled. The first district cost the city in wagon hire and other work, over and above the regular wagons and teams and street cleaning work, a sum of $354.14. It is expected that the other districts will cost as much. "Citizens are to remember," said Street Commissioner J. E. Lee, "that in addition to being willing, it is necessary to keep trash, of a sort that will burn or remain without offensive odor when dumped, separate from any other sort. The trash, anything destructible or capable of disintegrating without odor in a dump, will be hauled away by the city. No garbage, dead animal or bird is to be placed in this collection. Neither will the matter be hauled away if ashes are included. Ashes are not unsanitary and may be banked in the yard or boxed until such time as the citizen may get a wagon to haul it away. As to garbage there is at least one concern ready to enter into contract with the citizens for hauling this away at comparatively little cost. The concern will supply the cans. Nothing is to be thrown into the alleys. These have been cleaned. The city will have six wagons and teams, after the clean-up proceedings are ended, each covering its district, going through all of the alleys. These wagons will take away all trash collections at least once a month and the alleys will be kept clean.

Cost 26 Cents Per Capita to Clean Streets

Corning, N. Y.—The regular sweeping of the city's paved streets was begun March 20 and continued through the summer until October 20, in 1911, says Win. C. Sleight in his report to the Board of Public Works as superintendent. The appropriation for the cleaning of paved streets has not been proportionately increased in the past three years with the building of additional pavements. The appropriation, $3,500, remaining the same each year, notwithstanding that over a mile of new pavement has been laid in the seasons 1909-1910. The past year $3,526 has been expended in this fund, a small balance remaining from last year. There is a total of 7¼ miles of pavements in the city and this requires from 12 to 13 men continuously at the work during the season.

Satisfactory Test of Incinerator

Saranac Lake, N. Y.—The official test of the garbage incinerator recently made in the presence of the village trustees proved very satisfactory and the plant will soon be officially accepted. The plant has been in use for several weeks, and the village has been paying a man to operate the crematory. The incinerator will now be closed on account of a lack of funds with which to operate it. The operating cost includes the pay of an engineer at about $2 a day and the payment for coal, a small quantity of which has to be burned in order to insure the complete consuming of the refuse. President Vosburgh, in speaking of the test, said the incinerator, guaranteed to burn fifteen tons a day, would do as much as claimed for it, at least. He said no figures were kept at the test, because no weighing machines were available. The plant consumed a large quantity of mixed, wet and frozen waste material in a short space of time and gave every appearance of being in the best of working order. The incinerator was erected by the Dixon Engineering & Construction Company, of Toledo, O., and cost $9,000.

New Flag of the Women's Campaign

Baltimore, Md.—The Women's Civic League in their campaign for a clean city will make use of a white flag with the motto "Clean City Crusade." They will be sold for ten cents apiece and the members of the Civic League are in hopes many will be purchased and used on February 7, the anniversary of the big Baltimore fire, by displaying one or more of these flags from a front window. Some of the members are so enthusiastic about the crusade that they will fly a white banner from every window of their houses.

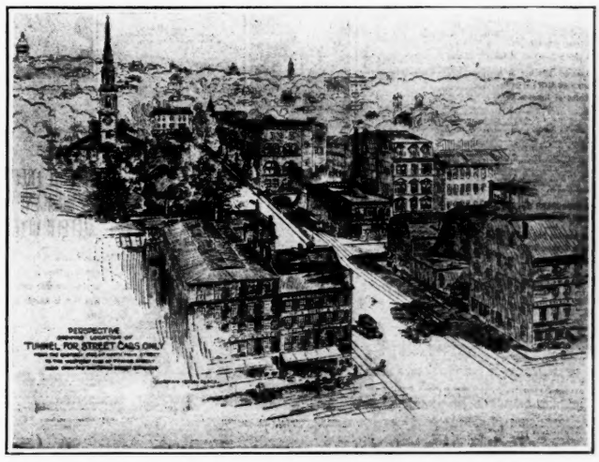
Says Odor of Garbage Reduction Plant is Not Offensive

Washington, D. C.—At a hearing before the House recently on the question of establishing a garbage reduction plant on the workhouse property at Occoquan, Va., a number of interesting facts relative to garbage reduction were brought forth. Mr. Taylor, of Ohio, spoke of the garbage disposal plant in Columbus, O., and said: "After the grease and water are extracted by pressure, the balance of the product, after being cooked, is ground up and dried, and it comes out in the form of fertilizer. I asked to have some of the product sent on to me. This substance which I have in this glass jar is the product known as fertilizer. I have heard gentlemen say that these plants are a nuisance because of the nauseous odor. I shall state, after having gone completely through the plant, that I defy any person living a quarter of a mile away from the plant to find any objectionable odor. There is a faint odor, like burnt sugar, which you can smell in the product, and that is noticeable in the plant; but that is the only odor, and it is by no means offensive. For that product an average of $10.15 a ton is received, and there is a demand for all that can possibly be manufactured. The grease, after final extraction, is of a dark color, and it sells for $100.60 a ton." An expert who has made a study of Washington's garbage claims that the garbage of the city of Washington is richer in the percentage of grease than any other city in the United States. It is richer than in New York. It is richer for this reason: There are more hotels, more apartment houses, and less of the tenement element, which in the great cities is so poor that they eat mighty close down to the garbage.

RAPID TRANSIT

Westerly Entrance of Proposed New Tunnel

Providence, R. I.—The proposition for the construction and operation of the proposed East Side tunnel, which was drafted by the East Side Approach Commission, is pending before Council. The plan calls for the removal of the Arnold block, which will give a street between Canal and North Main streets of 110 feet width, and will form an extension of Waterman street to Canal street.



Courtesy Providence *Evening Bulletin.*
ENTRANCE OF PROPOSED EAST SIDE TUNNEL.

The plan also provides for double tracks along the south side of this new thoroughfare, which will lead to the tunnel, and for a single track along the north side, which will accommodate the street car lines from the northern part of the city. The width of the tunnel will be 24 feet and the height as it enters the hill will be 14 feet. Beyond the School of Design property the height of the tunnel will increase to 16 feet. The west, or the North Main street portal, will be arched, the entrance being left for any architectural finish that may be decided upon by the city. The tunnel roof beyond the arched entrance will be of three-cornered arch type. There will be room in the tunel for two car tracks, but no provision for any other traffic. There will be a clearance between the tracks and the walls on either side of the tunnel of 2 feet 6 inches, and 10 feet between the centers of the tracks.

Detroit Votes Down Street Car Ordinance

Detroit, Mich.—The opponents of the city administration and of the Thompson-Hally street car ordinance granting three-cent fare were jubilant over the decisive victory they scored when the measure at a referendum was defeated by a vote of 30,648 to 22,259. They now predict sucess for their municipal ownership plan. According to the opponets of the franchise it was the working people who repudiated the mayor and refused to vote for the measure which they termed a "franchise containing many jokers." The Detroit Federation of Labor and the Municipal Ownership Committee, who were opposed to the ordinance because they claimed it did not contain a practical municipal ownership clause, were highly pleased over the result and predicted that the city would own its street car lines within a few years. The franchise on some of the lines has already expired and five resolutions have been introduced in council asking that a reduction in fare and better service be given on these lines.

Fifty New Street Cars for Detroit

Detroit, Mich.—Detroit is to have 50 new street cars of the latest design for use this coming summer. The Kuhlman Car Company has been given the order for the cars and will at once begin work on them. The cars will be of the latest pay-enter type, double truck, with enclosed ends. It is expected that all fifty of the cars will be ready for delivery early in the spring. Five-cent fares will be collected on them and will aid in paying for them.

MISCELLANEOUS

National Move to Beautify Cities

Nashville, Tenn.—J. Matt Williams, of the Nashville Real Estate Exchange is in communication with the National Association of Real Estate Exchanges, and has had much correspondence from it regarding the co-operation of this city with the movement to establish vacant lot and home garden clubs. The national association is sending literature on the subject to various exchanges throughout the United States. The purpose of the movement is to clear the city of unsightly vacant lots, which in some instances are strewn with tin cans, paper and other debris, which mar the beauty of the city, especially in central portions. And it is intended to convert these lots into gardens, which can be done at small expense, and greatly beautify the city.

$500 to Own Slot Machine

Decatur, Ala.—If slot machines are longer operated in Decatur, they will be compelled to pay an annual license of $500. This is the law as laid down by the city council on a motion made before the council by Alderman William E. Crawford, and was favored by Mayor H. A. Skeggs and the entire Board of Aldermen.

1,000 Queens Street Signs

Brooklyn, N. Y.—The Highway Department of Queens has completed its work of putting up street signs on all the highways of the borough upon which are trolley railroads, and 1,000 and more double two-ways and single two-ways signs have been placed in position. These sheet iron signs are white gothic letters, on a blue enamel background, that can be read plainly from a trolley car.

Bain Wants City to Stop Smoke Nuisance

Portland, Ore.—Owing to the steadily increasing smoke nuisance, John Bain, for the Municipal Association, will again direct the attention of the Mayor to this condition, requesting that the matter be called to the attention of the council. Mr. Bain addressed a communication to the Mayor several weeks ago on this subject, expecting that the communication would be read to the council, but as this has not been done, a second letter is to follow, the presumption being that the Mayor supposed copies of the original letter had been sent to the councilmen.

City Has Municipal Research Bureau.

Jersey City, N. J.—The Bureau of Municipal Research of Jersey City, has been incorporated and has started to enroll members in the organization formed to correct evils in the city and Hudson County. Here are the purposes for which the bureau has been incorporated: "To serve all Jersey City and Hudson County interests as a non-partisan and scientific agency of citizen inquiry. To collect, classify and interpret the facts regarding the state and conditions, powers, duties, limitations and administrative problems of each department available to public officials and to citizens, in order that wasteful, extravagant and inefficient ways, means and methods of administration and otherwise may be eliminated, and economical and efficient ways, means and methods be encouraged. To systematically foster the development and betterment of said city and county, and to devise and promote a constructive program of procedure in all city and county matters and affairs, which may be based upon adequate knowledge and consideration of community needs.' The incorporators are Frank Stevens, Louis Sherwood, William H. Richardson, Walter G. Muirheld and C. Howard Slater.

New York Civic Center Plans Submitted

New York, N. Y.—Plans for the site of a new court house and for the incidental creation of a civic center were laid before the Board of Estimate by its committee. If it is carried into effect the entire appearance of the district north of the hall of records and the municipal building from Lafayette street to Mulberry Bend Park will be changed. A new square will be laid out, in the center of which will be the court house over Center street. There will be no buildings intervening between the court house square and the park. The cost of the land to be taken at once by the city will be, it is reckoned, between $6,000,000 and $6,500,000, independent of the cost of the building.

Monterey's Mayor Starts Crusade for Improvements

Monterey, Mex.—Monterey's new Mayor, Alfredo Perez, has ordered the Monterey Street Railway and Light Co. to repair the streets between their tracks both inside and out of city limits, giving 30 days' time in which the work is to be done. In the event that the company does not comply, a heavy fine is to be imposed. Mayor Perez has also closed up a gambling joint on Zaragoza street. The new Mayor, accompanied by several commissioners, paid a visit to the Monterey slaughter house in San Luisito and reforms are to be instituted there and cold storage will be required in all butcher shops.

Establish Municipal Employment Bureau

Schenectady, N. Y.—A municipal employment bureau has been established with offices in the city hall annex under charge of Mrs. Charles K. Kreusi, wife of the commissioner of charities. Mrs. Kreusi has volunteered her services to the city and the whole establishment will be conducted without any cost excepting a telephone. Mrs. Kreusi has secured positions for a number of worthy persons.

Will Furnish Free Trees and Shrubs

San Antonio, Tex.—F. F. Collins, owner of Collins' Gardens and a director of the Civic Improvement League, has announced a plan by which he hopes to make San Antonio homes beautiful. Beginning February 1 any person who comes to Collins' Gardens who own their home, the valuation of which does not exceed $2,500, will receive free shrubs and trees.

Year's Record of Municipal Improvements Unparalleled

Hastings, Neb.—In the way of municipal improvements, which are a sure token of the progressiveness of the community, Hastings has made a record during the year that is said to be without parallel among the Nebraska cities of her class for this or any other year. Including over four miles of street paving finished in the twelve months ending this fall and for sewer extensions and improvements in the water and light department finished or contracted for during the calendar year Hastings' bill is approximately $250,000. This year's improvements bring the value of the water system up to $200,000 and the value of the electric light and power system up to $140,000, making a total for the two of $340,000. The bonded debt of the city was decreased during the last ten years from $285,000 to $195,000, but the $50,000 issue of intersection bonds this year brought the total back to $245,000, which is still far less than the value of the city's investments in the two municipal enterprises. Bond issues of $110,000 for the water plant and an original bond issue of $20,000 for the light and power plant gave the only public aid these two plants have had, all the subsequent improvements having been paid for out of the earnings. Moreover, there has been no levy either for water used by the city or for street lighting. During the present year the city has invested about $8,000 in a new well and a new smokestack and about $9,000 in the installation of a new air compressor. Approximately $4,000 has been spent in the enlargement of the power house and the building of a coal storage house and a machine shop. Two boilers have been installed and are about ready to be placed in commission. When the settlement is made this improvement will represent a further investment of $3,000. Early this month the Council contracted for a new pump to cost $9,250 and the foundation and addition to the building about $3,000 more. Sewer extensions built and contracted for during the year show an outlay of over $7,000. The total cost of paving in the twelve months ending this fall was $206,460.08. Over 500 carloads of materials were shipped into Hastings for this paving, exclusive of the home brick used. The improvements now under way at the water and light plant will give ample capacity for a year or more, but it may be necessary next year to build a new reservoir. The most extensive municipal improvement contemplated for the coming year will be the installation of an ornamental lighting system in the business district. The property owners in the district have agreed to furnish the standards and the lamps and the city will bear the expense of providing the conduits and the wiring. This installation with the placing of all electric light and power wires underground in the business district, as already ordered by the council, will involve an expenditure of perhaps $25,000.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Injuries on Streets—Sewerage Plans

City of Birmingham vs. Crane.—In an action against a city for death of a child owing to the negligence of the city in permitting water to flow on the street in such quantity and with such force as to wash intestate into the mouth of a sewer negligently left open, defendant cannot escape liability on the ground that the accident was the result of a defective sewer plan, where it appears that there was a palpable lack of skill in constructing the sewer which should have been appreciated by men of ordinary understanding, or where its unfitness had been demonstrated by previous experience.—Supreme Court of Alabama, 56 S. R., 723.

Personal Injuries—Waiver of Claim

City of New Decatur vs. Chappell.—A claimant for injuries on a defective sidewalk of a city notified the council by letter of the accident and asked for a settlement. The matter was referred to a committee, with directions to consider the claim and report. The claimant thereafter appeared before the council, pursuant to invitation, and made a verbal statement, and the committee was required by resolution to meet at the earliest time practicable to act on the claim. The committee did not act, and it failed to meet. At a subsequent meeting of the council the matter was mentioned, and the city attorney stated that there was nothing for the council to do with the claim, as the claimant had not appeared. Held, that the city did not waive the notice prescribed by Code 1907 as a condition precedent for the maintenance of an action for the injuries.—Appellate Court of Alabama, 56 S. R., 764.

Annexation of Territory—Ordinance or Resolution

City of Batesville vs. Ball et al.—Kirby's Digest provides that, when any municipal corporation desires to annex any contiguous territory lying in the same county, it shall be lawful for the council to submit the question to the qualified electors at least one month before the annual election, and, if a majority of votes cast favor the annexation, the corporation shall present a petition to the county court praying therefor. Held, that since in such proceeding the county court is the tribunal to finally pass on the question of annexation, the concurrence of the council being only needed for the submission of the question to the voters, its consent may be evidenced by a resolution only, passed by a majority of a quorum, and was not required to be by ordinance concurred in by two-thirds of all the council members elected.—Supreme Court of Arkansas, 140 S. W. R., 712.

Power to Acquire Land for Cemetery

City of Ft. Smith vs. Wilson.—Kirby's Dig. gives cities power to regulate the burial of the dead, to provide without the corporate limits places for interment, and to prevent interment within such limits except in public burying grounds, established before the enactment of the statutes, and further authorizes them to cause any body, interred contrary to the prohibition herein, to be taken up and buried without the corporate limits. Section 5436 declares cities capable of acquiring and holding real property and of exercising such other powers as are incident to similar corporations, and not inconsistent with law. Held, that section 5449 was not a limitation upon the powers of cities to acquire land for cemetery purposes, but an enlargement of such powers, and, in connection with the other statute, authorized the city to acquire land within the corporate limits for cemetery purposes.—Supreme Court of Arkansas, 140 S. W. R., 733.

Animals Running at Large—Ordinances

City of De Queen vs. Fenton.—An owner of cattle, residing outside a municipality, whose cattle stray therein and run at large within the corporate limits with his knowledge, permits and allows them so to do, and is amenable to a city ordinance, making it a misdemeanor for an owner of cattle to permit or allow them to run at large within the city limits.—Supreme Court of Arkansas, 140 S. W. R., 716.

Telephones—Franchises—Estoppel

Farmers' Telephone Co. of Quimby vs. Town of Washta et al. (Iowa Telephone Co., Intervener).—A telephone company, obtaining from a town a franchise to establish and operate a telephone exchange therein, made no attempt for 10 years to exercise any right to establish a telephone exchange, and during that time it merely maintained a toll line into the city. Under the protection of a temporary injunction, it established a telephone exchange. Held, that the town was not estopped from relying on the invalidity of the franchise, so far as it affected a telephone exchange, and a decree, requiring the removal of the exchange, but permitting the toll line, was proper, as against the claim of estoppel.—Supreme Court of Iowa, 133 N. W. R., 361.

Annexation of Territory—Proceedings

Village of Wakefield vs. Utecht et al.—In an action to annex additional territory to a village, the burden is upon the village to establish, by sufficient averments and evidence, that the territory sought to be annexed will be benefited by the annexation, or that justice and equity require that such territory be annexed.—Supreme Court of Nebraska, 133 N. W. R.

Railroad Franchise—Federal Question

Missouri & Kansas Interurban Railway Company et al Plffs. in Err., vs. City of Olathe, Kans.—A decision of the highest court of a State, enforcing the payment by a street railway company to a municipality of the sum contracted to be paid when the road should be completed, is not reviewable in the Federal Supreme Court, as giving effect to a resolution of the common council which the company asserts impaired its contract right to construct a certain turn-out, where the court placed its decision distinctly upon the ground that, without regard to that resolution or to the question of the right of the company to construct the turn-out, the money was payable because the road had been substantially completed.—U. S. Supreme Court, 32 S. C. R., 47.

Sewer Contracts—Extra Work

Ruch vs. York City.—Where a contract for the construction of a sewer gives the engineer authority to determine the amount, quality, acceptability and fitness of the several amounts of work and material, and to decide all questions as to the measurement of quantities and fulfillment of the contract, and to determine questions respecting the true construction or meaning of the plans and specifications and the contract contemplates extra work, it is for the engineer to decide whether additional sewers, and removing and relaying paving on the streets where they were laid, and excavations for house connections to a greater depth than that specified in the contract were "work not otherwise provided for" which was to be paid for as extra work. Where a city's contract for the construction of a sewer states a unit price, and it is stipulated that the quantities of work shown on the plans are only approximate, the contractors can recover only unit prices, and not for extra work for additional sewers, extra excavations of house trenches to a greater depth than that specified in the contract, and for the removal and replacing of pavements involved in laying the additional sewers. Under a contract for the construction of sewers, authorizing the engineer to construe the plans and specifications and to determine what is and what is not extra work, but not giving him power to construe the contract as a whole, he exceeds his jurisdiction where he passes on a claim for damages for failure of the city to provide an outlet for sewers, since such a decision involves a construction of the whole contract, and not merely of the plans and specifications.—Supreme Court of Pennsylvania, 81 A. R., 891.

Breakage of Water Mains—Negligence

Monomoy County vs. City of New York.—A finding that the failure of a city to send a man to shut off the flow of water from a broken water main for over an hour after notice of the break, causing injury to property of an individual, was negligence, is not erroneous as a matter of law. A city negligently failing to shut off the flow of water in a broken water main is liable only for the damages resulting therefrom, and, where property was flooded and damaged before the city could possibly have been expected to shut off the water, it was not liable for a negligent failure to shut off the water, especially where the owner was negligent in allowing the property to remain where the water would spoil it.—New York Supreme Court, 132 N. Y. S., 438.

NEWS OF THE SOCIETIES

Allied Civic Bodies of Pennsylvania

Mayors, presidents of city councils, city officials and others interested met at Lancaster, January 18-19. The following program was carried out:

Thursday, 10 a. m.—Address of welcome, Mayor Frank B. McClain; reply, George R. Wallace, Pittsburgh; report of the secretary, Ira R. Stratton, Reading; report of the treasurer, Jacob Umnitz, Erie; appointment of committees; address, A. M. Fuller, Meadville, president Allied Civic Bodies; address, "The American City and Its Government," George W. Guthrie, of Pittsburgh; noon recess, adjourn until 2 p. m.

2 p. m.—Address, "Division of Powers and the Party Boss," George R. Wallace, Pittsburgh; address, "The Essentials of the Commission Plan," John Wallace Cooper, Ph.D., Lancaster; address, "Future Legislation," Manley O. Brown, Meadville, chairman of the Law Committee; evening recess, adjourn until 8 p. m.

8 p. m.—Open forum—General discussion of the question of "Municipal Government by Commission." The subject was introduced in a brief address by Prof. Ford H. MacGregor, Department of Political Science, University of Wisconsin.

Friday, 9.30 a. m.—Address, "Some Present Day Tendencies of Democracy," Prof. A. V. Heister, of Franklin and Marshall College, Lancaster; address, "Commission Government in the West," Prof. Ford H. MacGregor, of the University of Wisconsin; noon recess, adjourn until 2 p. m.

2 p. m.—"The Application of Commission Government to Cities of the Third Class in Pennsylvania," Dr. L. S. Rowe, professor of Political Science, University of Pennsylvania, followed by a short address by Dr. Clyde L. King, instructor in Political Science, University of Pennsylvania; address, "Getting Better Legislation," J. Horace McFarland, Harrisburg, president American Civic Association; report of Nominating Committee: election of officers and reports of committees.

After a lively debate, in which a more radical preamble was condemned by some of the speakers as "an insult to the legislature," the convention adopted this resolution as embodying its ideal for the foundation of the commission form of government for cities of the third class and boroughs:

Whereas, The present plan of government in cities of the third class has proven most unsatisfactory to the people, experience demonstrating that it tends to waste and inefficiency at the cost of the taxpayers generally; therefore, be it

Resolved, That the Committee on Laws of this organization be directed to prepare a bill to be presented to the next legislature, embodying the following provisions:

First. The election of a small council of five members, with a salary sufficiently large to justify the members elected to devote all their time to the affairs of the city and to insure the selection of capable men.

Second. The council to be nominated and elected at large on a non-partisan ballot.

Third. The council to appoint all subordinate officials and employes, with the power of removing them at will. Each councilman shall be the head of a department of the city and shall be responsible for the affairs of that department.

Fourth. The initiative, referendum, recall and civil service.

The preamble that was turned down as being insolent and out of place was worded thus:

That in its operation the present plan of government has placed the control of our municipal affairs in the hands of a political machine, which has exploited for its own personal benefit, and it is the desire of this body to present to and secure from the next legislature such a law as will prevent this evil and place the right of control of our municipal affairs in the hands of the people. That present conditions have become intolerable and a remedy must be provided.

Indiana Sanitary and Water Supply Association

The fifth annual meeting will be held in Indianapolis, February 15-16. The program is now practically completed and includes the following speakers: Prof. Halford Erickson, of the Wisconsin Railway Commission; George B. Young, Commissioner of Health of Chicago; T. C. Phillips, of the Department of Water Waste Survey, Chicago; R. L. Sackett, Professor of Sanitary Engineering, Purdue University; George E. Kessler, Landscape Engineer; George W. Fuller, Consulting Engineer, New York City; Prof. McGee of the National Department of Agriculture, Washington, D. C.; H. E. Barnard, Indiana State Food and Drug Commissioner; E. L. Loomis, Superintendent Water Department, Valparaiso; Dow R. Gwinn, President Terre Haute Water Works; J. F. O'Donnell, Indianapolis Water Company; Richard Lieber, Member Indianapolis Commission on Fire Insurance; F. C. Newall, Chief of United States Hydrographic Survey, Washington, D. C., and others.

Among the papers to be given are the following: "Fire Waste and Fire Prevention," "Latest Development in Water Purification Methods," "Management of Water Plants in the Smaller Cities," "The Wisconsin Public Utilities Commission," "The Value to a Community of the Purification of its Streams," "Pitometer Surveys and other Similar Rigid Inspection," "The Report of the Condition of White River, with suggestions on Sewage Disposal," etc.

Commercial Club, Centralia, Ill.

A banquet was held January 8, for the purpose of discussing good roads. C. A. Kiler, Champaign, the first speaker, after reviewing recent legislation regarding road matters, presented the following figures for roads and bridges built in Illinois in 1911. He said that the records at Springfield show that over $7,000,000 was collected from the people for roads and bridges and that $4,000,000 was for roads alone, an average of $40,000 to each county. H. B. Bushnell, Assistant State Highway Commissioner, described the duties and activities of the State Department. He said that it takes time and money to get a community started right, but when the education is once started it grows rapidly and instead of the people fighting road improvements, they demand them faster than they can be provided. C. M. Cottam, of the Barrett Manufacturing Co,, St. Louis, Mo., described the various processes of laying tarna. H. L. Collier, of the Yellow Pine Association, St. Louis, described modern methods of constructing creosoted wooden block pavement. Mr. McConnell, of the Atlas Portland Cement Co., Chicago, described the cement paving laid in Sioux City, Ia., and elsewhere.

Indiana Public Improvement Association

The annual convention was held at Indianapolis, January 12. Officers were elected as follows: President, Fred Cunningham, of Covington; vice-president, John Holloran, of Indianapolis, and secretary-treasurer, Alfred H. Barnes, of Logansport.

One of the chief topics of the round table discussion was road building. W. A. Irwin, of Frankfort, led the discussion. It was his opinion that the best work done in road construction and repairing is done by contract instead of by the system of having the work directed by men who have obtained their positions through political appointment. All road work, he said, should be done under the direction of an engineer.

Mr. Cunningham, the new president of the association, said that in road repairs the road authorities do not get returns in comparison with the great expenditures. He thought that closer attention should be given to repairing roads just as soon as they need repairing. Other speakers commended the double-track road system in Adams county where gravel or macadam roads are paralleled by dirt roads, which are used alternately, according to the state of the weather.

Clarence Kenyon, of Indianapolis, told of efforts being made by good roads advocates in various parts of the country to obtain United States government aid for road building, and in compliance with his suggestion the association passed a resolution advocating government aid. Mr. Kenyon will represent the commercial bodies of Indiana in the effort to obtain United States government assistance. Mr. Kenyon explained the proposed plan for a State highway commission for Indiana and dwelt on the need for a more modern system in this State for taking care of roads and building them.

Thomas Flinn, of Logansport, discussed the problems which the road superintendent has to meet. It was decided that at the next meeting of the association a special invitation would be given to civil engineers to attend.

The association passed resolutions recommending that county commissioners require bidders to prove their competency to handle the work for which they bid, and that the advertisement of road lettings state the length of the road, character of the material and the estimated cost.

The principal address at the opening session was made by Judge Q. A. Myers, of the Indiana Supreme Court. In taking up the legal side of a contractor's business, Judge Myers said all contractors should obtain copies of the two employers' liability acts passed by

the recent legislature and study them carefully. A painstaking examination of these acts by contractors, he said, would save them much trouble, as the liability laws cover much ground and are full of details. Another thing which he said the contractors should never overlook is the necessity for a clearly worded and easily understood contract. "Beware of contracts which are not easily understood," said Judge Myers. "You can depend upon it that if all parts of the contracts are not clear, there is something wrong with them." Judge Myers advised all contractors to protect themselves by taking out indemnity insurance.

Strict honesty was urged by J. W. Craig, of Greensburg, who spoke on the qualifications which a contractor should have. He said there should be stricter laws against dishonest contractors in order that the honest ones might be protected more successfully. John Holloran, of Indianapolis, discussed problems in connection with the use of engines in hauling.

Robert C. Hillis, of Logansport, Ind., made a short explanation of the purposes of the Indiana Public Improvement Association, saying that it welcomed men in all lines of work who had anything to do with public improvements. One purpose of the organization, he said, was to bring the men together in order that they might learn about the best and latest improved devices and machinery in building and to meet representatives of manufacturing firms. A number of manufacturing firms have exhibits at the Denison Hotel.

Iowa Association of Cement Users

The eighth annual meeting of the association was held at Butte, January 11-13. The following officers were elected: F. P. Wilson, city engineer, Mason City, president; H. H. Dean, city engineer, Glenwood, vice-president; P. H. Atwood, Armstrong, Ia., second vice-president; Keyes C. Gaynor, city engineer, Sioux City, treasurer; A. O. Anderson, Ames, secretary.

The next meeting place was not chosen at the convention. The executive committee, which comprises the officers of the association, meet during the year and select the place. Mason City, Waterloo and Fort Dodge were among the cities mentioned for the 1913 convention.

"Concrete Paving; Surfaces and Expansion Joints," was the subject of an interesting paper by Keyes C. Gaynor. One of the features of his paper was a history of concrete pavement. Mr. Gaynor said in part:

"In 1890 wide cement gutters were laid on the main street in Bellefontaine, Ohio. They proved so successful that four streets were paved (in 1893 and 1894). In 1894 concrete alleyways were laid in Boston and these have proved to be very successful. Concrete street pavement was laid in Richmond, Ind., as early as 1896, and was so successful that they are still laying more concrete pavement in that place. Since these pavements were laid numerous concrete pavements have been laid in Denver, Kansas City, Fond du Lac and De Pere, Wis.; Mason City, Ia.; Toronto, Ont., and Bemidji, Minn., in the north, as well as in many southern cities, including the city of Panama. Special forms of pavements such as the R. O. Blome Company hold patents on have been laid in Washington, D. C.; Hawthorne, Ill.; Union Stock Yards and Howard street, Chicago; Gary, Ind.; New Orleans; Bozeman, Mont.; Grand Forks, N. D., and in a great many other cities, both in the north and south. The Hassam pavement is another concrete pavement which has been widely laid. Not only has concrete been successful on city streets, but it has also been laid on country roads and given satisfaction. In Wayne county, Michigan, the concrete has been so satisfactory that this last year (1911) the county road commissioners have constructed 21 miles of concrete roads. They find that they can build a concrete road about as cheaply as they can a macadam road, and that it will wear much longer and better. Coshocton county, Ohio, has also constructed several roads of concrete to take the place of macadam roads which have failed to carry the traffic. In all these different towns they have not used the same kind of construction. The main difference, however, is in the methods of finishing the top, in spacing the expansion and contraction joints, and in finishing the joints themselves."

George P. Dieckmann, of Mason City, read a paper on "The Requisites of Good Concrete" and F. P. Wilson spoke of the results of concrete paving in Mason City.

Friday evening the delegates to the number of 150 were the guests at a supper and "smoker" at the Commercial Club rooms. Songs and stories were the order of the evening. The affair was in charge of W. E. Holmes, secretary of the Commercial Club.

Calendar of Meetings

February 13-14.
Connecticut Society of Civil Engineers.—Annual Meeting, New Haven, Conn.—J. Frederic Jackson, Secretary, Box 1304, New Haven, Conn.

February 14-15.
New England Association of Gas Engineers.—Annual Meeting, Boston, Mass.—N. W. Gifford, Secretary, 26 Central Sq., East Boston, Mass.

February 14-16.
Engineering Society of Wisconsin.—Annual Meeting, Madison, Wis.—J. C. White, Secretary, 624 East Main St., Madison, Wis.

February 15-16.
Indiana Sanitary and Water Supply Association.—Fourth Annual Convention, Indianapolis, Ind.—Dr. W. F. King, Secretary, Indianapolis, Ind.

February 21-23.
Iowa Engineering Society.—Annual Meeting, Davenport, Ia.—S. M. Woodward, Secretary, Iowa City, Ia.

February 21-28.
Fifth Annual Chicago Cement Show—Coliseum.—J. P. Beck, General Manager Cement Products Exhibition Co., 72 W. Adams St., Chicago, Ill.

March 6-9.
National Brick Manufacturers' Association.—Annual Convention, Chicago, Ill.—T. A. Randall, Secretary, Indianapolis, Ind.

March 7-12.
International Brick and Clay Products Exposition—Coliseum. Chicago, Ill.—Office, 815 Chamber of Commerce Bldg., Chicago, Ill.

March 7-12.
International Brick and Clay Products Exposition, Chicago, Ill.—Office, 815 Chamber of Commerce Bldg. Chicago.

March 14-21.
First Annual Kansas City Cement Show—Convention Hall.—J. P. Beck, General Manager Cement Products Exhibition Co., 72 W. Adams St., Chicago.

June 3-8.
American Water Works Association.—Annual Convention, Louisville, Ky.—John M. Diven, Secretary, Charleston, S. C.

PERSONALS

AVRET, L. L., Vidalia, Ga., has been re-elected Chief of the Fire Department.

BRUNSON, CAPT. HAROLD M., Florence, S. C., has been elected Chief of Police.

CARABIN, JOHN, Hillyard, Wash., has been appointed Chief of the Fire Department.

ELLIS, HARRIS, JR., Richmond, Va., vice-president Atlantic Bitulithic Company, died suddenly last week.

GLASS, PERLE, Corona, Cal., has been appointed Chief of the Fire Department.

GOETSCHIUS, JOHN HENRY, Totowa, N. J., one of the oldest civil engineers in that part of the State, died at his home January 25, aged 83 years.

HARDEE, CAPT. W. J., New Orleans, La., City Engineer, has been elected President of the Association for Standardizing Paving Specifications.

HARING, JAS. S., Crafton, Pa., has been appointed Borough Engineer, and will take charge of the construction of a new sewage-disposal plant at that place.

HERROLD, G. H., M. W. Soc. Eng., M. Am. Ry. Eng. Assoc., St. Paul, Minn., recently engineer maintenance of way, Chicago Great Western Railroad, has opened an office in the Hackney building, St. Paul, for the general practice of engineering.

HOSMER, EDWARD S., Lowell, Mass., has been reappointed Chief of the Fire Department.

MOORE, JOSEPH A., Rosendale, Mass., has, after 44 years of service as an officer in the service of the State or as head of the Police Department, retired from the position of Deputy Chief of the Inspection Department of the Massachusetts District Police. The latter position he has held for over twenty-five years.

RINGER, C. W., Minneapolis, Minn., has been unanimously re-elected Chief of the Fire Department.

ROWE, W. A., San Fernando, Cal., has been appointed Chief of the Fire Department.

STRADLING, DAVID D., Indianapolis, Ind., who has held the position of City Engineer, has been appointed Assistant Professor of Civil Engineering at the University of Kansas.

SULLIVAN, PETER, Phœnix, Ariz., has been made Fire Department Chief.

WETMORE, W. G., Meridian, Miss., has resigned the position of City Engineer.

WILSON, THOS. W., Poughkeepsie, N. Y., who has occupied the position of General Superintendent of the Fiat Plant, has been appointed Works Manager of the Okland Motor Car Company at the plant at Pontiac, Mich.

The following Mayors have been elected:

OHIO.

Gibsonburg—Rudolph Smith.

TENNESSEE.

Woodbury—Chas. Flirnin.
Whiteville—J. W. Bass.
Knoxville—S. G. Heiskell.

CONNECTICUT.

Middletown—John L. Fisk.

GEORGIA.

Uvalda—Wallace Moses.
Thomasville—H. J. MacIntyre.

FLORIDA.

Tallahassee—D. M. Lowry.

MUNICIPAL APPLIANCES

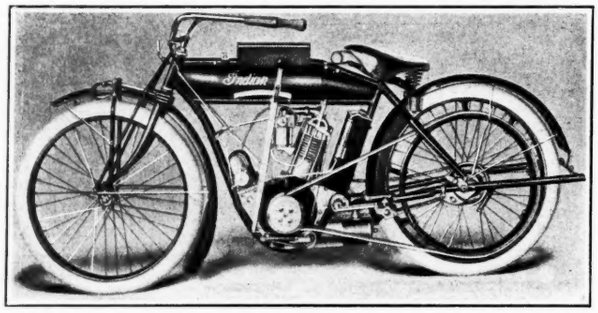
The Belt-Drive Indian

The single cylinder Indian with flat belt drive, introduced last year, has proved itself eminently satisfactory to riders who insist on this type of transmission, and this model will be continued during 1912 in the 4 horsepower size only. The Indian motors develop such a great amount of power that to apply belt drive satisfactorily to the twin cylinder machine would require a belt of inconvenient proportions, which would necessitate such wide pulleys that the machine would be too awkward to meet with public favor, and consequently no twin cylinder belt machine will be supplied.

The Hendee Mfg. Co., Springfield, Mass., does not believe in producing a cheap and slip-shod article, and consequently will not tolerate the makeshift of slipping the belt on the pulleys which is usually adopted. In the Indian belt drive machine an efficient clutch is incorporated in the engine pulley, which enables the machine to be controlled with a most perfect nicety without tearing the belt and pulley lagging to pieces by permitting the belt to slip to assist in maneuvering the machine.

As varying road conditions make it desirable to vary the tension of the belt, and to provide for a reasonable amount of stretch, an improved spring mounted idler pulley is applied to this machine. This is most conveniently operated by a small lever and quadrant mounted on top of the cylinder and within easy reach of the rider's hand.

The above construction of the Indian belt drive, with free engine clutch and spring mounted idler, is claimed to be the most conveniently operated and efficient machine of its class ever introduced, and in competitions from one mile to one hundred miles with other belt-driven machines to have proved itself superior.



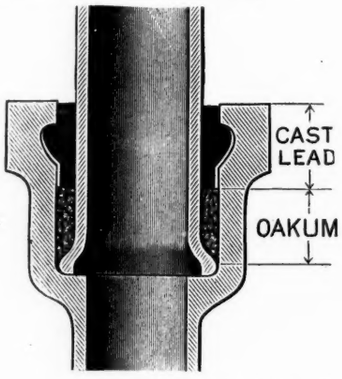
BELT-DRIVEN MOTORCYCLE.

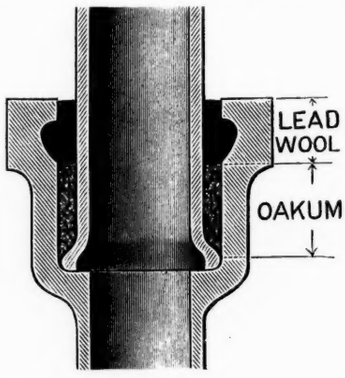
Lead Wool

The United Lead Company, 111 Broadway, New York City, manufacture lead wool, which they recommend for calking joints in cast iron pipes as a better and cheaper means than cast lead. The generally accepted method of jointing gas and water pipes by introducing into the socket strands of yarn and filling the space left with molten lead is objectionable because when lead contracts and space is left between the lead and the wall of the socket, making it necessary to calk the lead ring in order to make a tight joint. Moreover, if the joints are moist when lead is poured, leaks result.

Lead wool is made by a mechanical process of etremely thin, long fibers of pure lead, which when calked become practically a solid mass, filling the entire space reserved for it and making a tight joint. The melting pot is, of course, dispensed with, and wet joints, even those under water, can be repaired.

To make a lead wool joint the joint is first carefully calked with yarn to a depth considerably greater than when cast lead is used. The strands or skeins of lead wool are then introduced, each skein being calked separately.





CAST LEAD JOINT COMPARED WITH LEAD WOOL JOINT.

In calking joints which are to be subject to very high pressure or when pipes are used to carry acid solutions, lead wool should be introduced first and tightly calked into the socket, the yarns then introduced in the regular way and joint finished with lead wool, thus placing the yarn in a hermetically sealed space. This joint is also recommended where there is danger of pipes sagging or being subjected to vibrations of heavy traffic.

As a general rule, the manufacturers state that a lead wool joint costs less than a cast lead joint. The chief claim made, however, is that the lead wool joint is stronger and more durable than the cast joint. The pneumatic hammer may be used to advantage in making these joints.

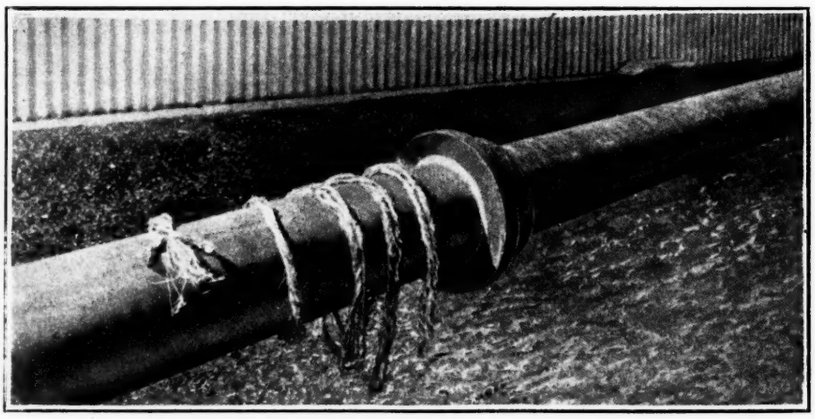
The approimate quantities of lead wool and yarn required for a 6-inch joint are 5½ pounds lead wool, making a joint 1⅛ inch deep, and 2⅝ pounds of yarn.

Condensite

A new form of insulating material which can be molded in the plastic condition for manifold applications has been put on the market by the Condensite Company of America, Glen Ridge, N. J., and is known as condensite. This material is a gumlike substance, transparent, hard, insoluble in alcohol and similar solvents, and of high di-electric strength. It does not fuse or soften under the action of heat. It is produced by the reaction between phenol and formaldehyde. This reaction has been known for many years, but heretofore no condensation product has been made free from water and other impurities and of a sufficiently uniform quality for practical use. For these reasons condensite is a radical departure from all previous products. The hardening element is added after the condensation is completed, and the application of heat then makes it hard, infusible and insoluble.

The material is especially adapted to use with ignition apparatus in juxtaposition to a motor on account of its exceptional resistance to heat. Another useful application is insulating parts of apparatus submerged in an electroplating bath, since it is not affected by chemicals and the metallic deposit does not creep over its surface.

The inventor of condensite is J. W. Aylsworth, who carried on a long series of experiments in developing this product.



JOINT FINISHED—STRAND READY FOR NEXT JOINT.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago—A number of important lettings are in prospect. Quotations: 4-inch, $26.50; 6 to 12-inch, $24.50; 16-inch and up, $24. Birmingham—The movement against contracts has increased materially and local plants are again in operation after having been forced to close down by reason of the extremely cold weather. It is understood that the U. S. C. I. P. & F. Co. will put the Dimmick plant at North Birmingham, Ala., in operation about March 1. There is a fair demand for small lots. Quotations: 4 to 6-inch, $23; 8 to 12-inch, $22; over 12-inch, average, $21; special fittings, $50 to $55. New York—The pipe trade seems quieter. Quotations: 6-inch, car loads, $22 to $23.

Studebaker Wagon.—S. F. Ferguson, Danville, Ill., has written the Studebaker Corporation, South Bend, Ind., regarding an accident which occurred to his wagon, testing it severely, but out of which it emerged victorious. The letter follows: "The other day one of my two yard Studebaker dump wagons was going down the middle of the street car track with two and one-half tons of crushed stone on it; the track was slick and the motorman was unable to stop his car. The driver, hearing the street car bell, had just time enough to get the team off the track when the car struck one of the rear wheels. The car was going just fast enough that it pushed the wagon sideways off the track and the car went twenty feet past the wagon before it was able to stop. The car had a broken fender and all of the glass in the vestibule was broken. The car was taken to the repair shop at once. The wagon lost about two square inches of nice yellow paint and the driver had a good laugh. A wagon has got to be a dandy when it can put a street car on the disabled list. This was a case where it paid me to pay a little more money than other makers ask and have the best. If you have any prospective customers that are in thought, or that would like to hear from me, I will be pleased to answer any questions put before me."

Feed Water Filter.—The Ross Valve Manufacturing Co., Troy, N. Y., isues a folder giving a list of more than 125 users of their feed water filters. Among the list are the following municipal departments or companies: Staten Island Water Co., New York City; Toledo Water Works, Toledo, O.; Lincoln Water Works, Lincoln, Mass.; Water Supply Co., Albuquesque, N. M.; City Water Works, East Liverpool, O.; Savannah Water Works, Savannah, Ga.; city of Milwaukee; Department of Public Works, New Westminster, B. C.

Crushed Stone.—The Producer's Stone Co., Chicago, Ill., which is said to have been a pooling medium for the principal stone companies in and about Chicago, has gone out of business. John B. Hittell, superintendent in charge of street repairs, predicts an immediate decline of 25 cents a cubic yard in the price of crushed stone. The dissolution was precipitated by the withdrawal of Dolese & Shepard, one of the largest individual concerns. Better tonnage results in the selling end was assigned as the reason for withdrawal.

Office Removal.—The H. W. Johns-Manville Co., owing to increasing business in Louisville, Ky., have found it necessary to move their offices from the Lincoln Savings Bank Building to 205 Paul Jones Building. The office will be in charge of Mr. J. R. Chowning, who is well and favorably known throughout that section, having traveled in that section from the Milwaukee office a considerable time. A complete line of well-known J.-M. asbestos and magnesia products, electrical supplies, packings, pipe coverings, roofings, etc., will be handled from this office.

Street Car Safety Guard.—The American Car Co., St. Louis, Mo., is exhibiting at its office, 334 Brandeis Theater building, a full sized model of a standard pay-as-you-enter car equipped with a Meyer safety guard. Martin Meyer, the inventor, is giving demonstrations to those interested. The device prevents passengers from getting on or off cars when they are in motion. It is neither obtrusive nor obstructive when raised or lowered, or in the act of being raised or lowered, although it is constructed of the best steel tubing and designed with a view to meet all possible tests. Its first effect is that of a warning sign to the careless or reckless passenger, but is built to forcibly restrain the passenger who disregards the warning. It is the intention of the company to have three more models constructed, which, when completed, will be taken to different sections of the United States, where numerous demands have been made on the company for a demonstration of the guard. Sixteen of the principal cities, among them New York, Philadelphia and Chicago, have signified a desire for a demonstration before their public safety committees at the earliest opportunity.

Asphalt Tests.—Owing to complaints made in regard to the construction of the asphalt pavement laid by the MacDonald Construction Co. on Luzerne street, Scranton, Pa., samples of the paving material were sent to three chemical engineers for analysis. The question at issue was in regard to the quality of the paving mixture and more particularly as to whether it was made with Trinidad asphalt. James H. De Long, associate professor of chemistry, Lafayette College, Easton, Pa., reported that the sample he received contained no natural asphalt. James J. Howard, New York, reported that Trinidad asphalt was used and the mixture was up to specifications. The Institute of Industrial Research said the asphalt used was Trinidad and that the mixture conformed with the specifications.

Crushing Plant.—One of the most up-to-date, modern stone-crushing plants has been erected by the Southern Bitulithic Company at Woodstock, Ala. This enterprise represents an investment of about $100,000 and will be welcomed by all users of special sized stone throughout the South, as machinery has been installed for the special purpose of crushing, separating and delivering to contractors any particular size stone they may need. We understand the company will also make a specialty of furnishing rip-rap or rubble stone. Headquarters of the Southern Bitulithic Company are located at 602 First National Bank building, Nashville, Tenn.

Water Company Suit.—The Springfield Consolidated Water Co. has been ordered by the court at Norristown, Pa., in the course of a suit against it by consumers attacking its increased rates, to submit a statement of its expenses under sub-divisions, heads and classifications, and give an intelligent showing of the application of the water rents received. This statement must show the new rates in the aggregate receipts, compared with the receipts under the old schedule. The receipts must show through the group of companies and their relation to each.

The company is required to furnish to plaintiffs information as to pipe lines, size of pipe, depth of trenches, character of pipe; also its buildings, reservoirs and other equipment, to obtain all the data necessary to make a fair appraisement of the entire property. To make a fair appraisement of the property the Court holds it is entitled to know what constitutes the defendant's holdings in real estate, water rights, buildings, improvements and other property connected with and forming part of the water plant and system operated by the Springfield Consolidated Water Co., the Springfield Water Co., the North Springfield Water Co. and the Conshohocken Gas and Water Co.

The Court refused to allow investigation by interrogatories of the initial cost of the various plants, and stated that the information as to the relations which a unit company of any other bears to the others in the group as to receipts, charges, maintenance, etc., was not a matter for proper inquiry.

Magnatite vs. Tungsten Lights.—A committee of the Lynn (Mass.) Board of Trade recently visited the Lynn works of the General Electric Company to inspect a demonstration of two methods of street lighting and various types of lighting poles. The two styles of lights which the company demonstrated on a boulevard contained wholly within their own property and in their factory were the new and inverted luminous arc light and the Tungsten cluster. The inverted luminous arc is the latest thing in street lamps on the market and has been featured but a short time. The first order received by the company for these lamps was from the city of New Haven, the installation of which was described in the Municipal Journal, January 4. Since the installation of these lignts several orders for them from other cities have been received. The committee was favorably impressed by the strong white light given out by the inverted luminous arcs. Drawings and sketches of various types of posts were shown and figures presented as to the costs of each. In demonstrating the lamps both in the shops and on the boulevard the two types were lit alternately.

Big Order of Asphalt.—What is believed to be the largest order for asphalt ever placed was recently closed by the San Francisco branch of the Barber Asphalt Paving Company. The company sold 50,000 tons for delivery at Portland, Ore., and interior points. The Standard Oil Company is said to be the purchaser. The value of the material at the market price is about $1,250,000. The freight charges will be about $85,000. Ludden & Christianson, ship owners, are the forwarding agents, and the shipment is consigned to W. J. Jones, of Brown & McCabe, stevedores, Portland, who will attend to its distribution. Late in January the first cargo of 1,200 to 1,500 tons will go forward.

Tasscoil.—The Alden Speare's Sons Co., with offices in Boston, New York and Chicago, have just issued an attractive pamphlet on their Tasscoil. This pamphlet shows some very attractive photographs of streets which have been treated with Tasscoil and reproduction of letters which have been received from parties who have used Tasscoil and have been pleased with the results.

Lutz Heater.—Architect Fitzpatrick, Washington, D. C., has suggested the following method of treating oiled and bituminous roads as a means of preventing slipperiness. Take one of the city's steam rollers, fasten sectional plates to the wheels, plates having spikes on their outer surface, or corrugations, a diaper pattern or irregular calks. Or even wrap the wheels about with heavy, square linked chains, anything that will produce a roughening effect upon a soft pavement. Then rig up in front of that roller a Lutz Heater or other appliance to warm up the surface of the road. Slowly run the roller, so equipped, up one side of a road and down the other and you've produced a roughening surface, even to a line, however, not cutting to tires, but affording a clinch for horses and men, a non-glazed roadway. And nothing would do the trick at less cost. Two or three rolls a year would keep a road in elegant shape.

Compressed Air Alarm.—Fire Chief Day and City Electrician Pierson, Long Branch, N. J., have been investigating devices for sounding public fire alarms. The steam whistle on the electric plant now used is inadequate and not centrally located. The tower bell at the court house cannot be heard very far unless the wind is right, partly, it is said, because it is hung too high. The compressed air alarm made by the Lober Fire Alarm Co., Stonington, Conn., it is thought will answer the requirements. It works automatically and takes the box numbers.

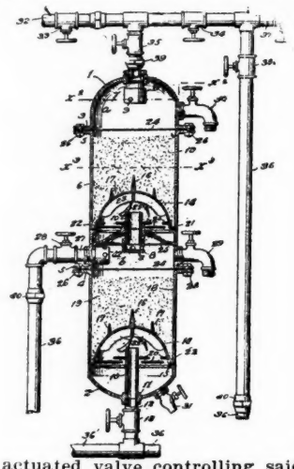
Nobby Tread Tires.—The United States Tire Co. is announcing to the trade and to consumers throughout the country that the manufacture and sale of Nobby Tread tires is continuing as heretofore. This statement is supplemented with an announcement to the effect that the company is under no prohibition from the courts. Application had been made for an injunction to restrain the United States Tire Co. from marketing Nobby Tread tires pending the result of an appeal, but the Court ruled that the injunction be suspended pending the appeal. This means, of course, that the handling of the tire will be carried on by the company in the same manner as previously.

Piping Materials.—The Best Manufacturing Co., Pittsburg, Pa., have issued a 396-page catalogue and handbook of piping materials for steam, air and water, including high pressure systems. Their line consists of valves, fittings, flanges, pipe and pipe bends, separators, etc., made from all suitable materials, as well as general iron castings up to fifty tons and cast steel valves and fittings. The catalogue is primarily intended for use by the purchasing and mechanical departments of their patrons and has been arranged with a special view to rapid reference. How well this has been done will be understood when it is stated that the index occupies twenty-four pages.

PATENT CLAIMS

1,014,849. CENTRIFUGAL WATER-CLARIFIER. William K. Richardson, Leavenworth, Kan. Serial No. 597,581.

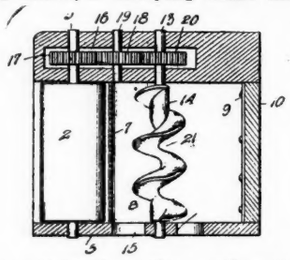
In a centrifugal water-clarifier, a rotary vessel in which the separation takes place contained within a shell, provided with a centrifugal liquid seal, said vessel having an inlet provided with a centrifugal liquid seal, an outlet, a centrif-



ugal actuated valve controlling said outlet, a chamber having outwardly tapering pockets provided with jet orifices at their diminished ends, said chamber provided with baffle plates surrounded by a strainer through which water must pass to reach the jet orifices of the pockets.

1,015,004. ROAD-GRADER ATTACHMENT. Philip Chounard, Pembina, N. D. Serial No. 625,271.

An attachment for road-grading machines, comprising a rectangular frame, one side of which is provided with a recessed casing and the other side having an integral shaft support, a depending bracket and a cut-out portion, a geared roller carrying shaft mounted in the recessed casing and extending transversely across the frame to the integral shaft support, a roller carried thereby and operating in the space between the recessed casing and the supporting structure, a geared conveyer carrying shaft mounted



in the recessed casing and extending transversely across the frame to the depending bracket, a conveyer carried thereby and operating in the space between the recessed casing and the depending bracket, a geared stub shaft mounted in the recessed casing intermediate the roller and conveyer shafts and meshing with said geared roller and conveyer carrying shafts, a belt passing over the roller, a vertical rear wall extending transversely across the frame, and a scraper device contacting with the roller to clean same.

1,014,711. METAL REINFORCING AND SPACING BAR. Alfred E. Lindau, St. Louis, Mo., assignor to Corrugated Bar Co., St. Louis, Mo., a Corporation of Missouri. Serial No. 604,690.

A metal reinforcing unit for concrete structures comprising a tension bar in combination with looped reinforcement, said tension bar having diametrically opposite longitudinal ribs and transverse

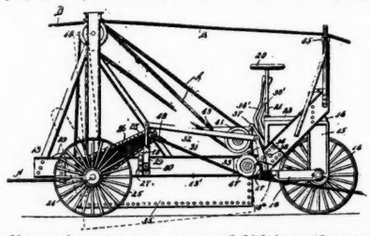
ribs at inervals extending from one longitudnal rib to the other, one of said longitudinal ribs being provided with a thin flange having spaced notches in the edge thereof in which are seated the loops of said reinforcement, said notches being of such depth that the adjacent corners of said flange overlap the sides of the loops seated therein, said corners being turned in to embrace the loops.

1,015,487. HOISTING-DRUM. Alvah D. Hadsel, Dorranceton, Pa., assignor to Cable Excavator Co., Philadelphia, Pa., a Copartnership. Serial No. 558,776. Renewed. Serial No. 638,210.

In a hoisting machine, the combination of a hoisting drum, a pair of driving gears of different sizes associated therewith, a friction clutch between each of said gears and the drum, controlling devices associated with the clutches whereby the frictional effect of the clutches will be simultaneously controlled in opposite directions, and means whereby the force of either clutch will be determined in accordance with the maximum load thereon.

1,015,488. EXCAVATOR. Alvah D. Hadsel, Wilkes-Barre, Pa., assignor to Cable Excavator Co., Philadelphia, Pa., a Copartnership. Serial No. 492,815. Renewed. Serial No. 638,211.

An excavator comprising a frame including an upright, a plurality of pulleys carried by the upright, a scoop mounted within the frame, a pair of pulleys on the rear end of the scoop, means to support each end of the scoop so that it may be elevated independently of any movement of the other end of the scoop, a rope connected to the rear end of the scoop and passing thence over certain of the upright pulleys, thence over the scoop pulleys, and thence over other of the upright



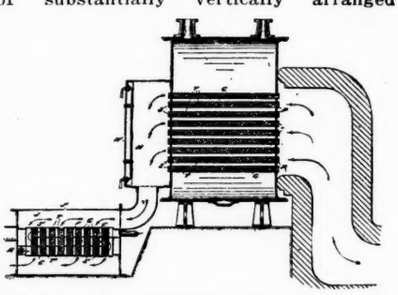
pulleys for the purpose of lifting the rear end of the scoop, and another rope serving to hoist the front end of the scoop.

1,015,486. EXCAVATOR. Alvah D. Hadsel, Dorranceton, Pa., assignor to Cable Excavator Co., Philadelphia, Pa., a Copartnership. Serial No. 559,788. Renewed. Serial No. 638,209.

In an excavator, a cradle, a pair of laterally spaced cables on which said cradle is movably mounted, means to vary the tension on said cables, a scoop pivoted near its front edge in said cradle, means to limit the downward pivotal movement of the scoop in the cradle, means connected to the scoop for the purpose of filling the same and conveying it with the cradle along the supporting cables, and means to cause the scoop to swing upwardly and forwardly with respect to its pivotal connection with the cradle for dumping.

1,015 131. MEANS AND APPARATUS FOR THE GENERATION OF STEAM. William Arthur Bone and James William Wilson, Leeds, and Cyril Douglas McCourt, London, England. Serial No. 623,179.

In water heaters, a heater inlet chamber adapted to receive hot gases, a series of substantially vertically arranged



heater tubes communicating with said heater inlet chamber, an exhaust passage communicating with the discharge end of said heater tubes and an exhaust fan connected with said exhaust passage to draw the cooled gases therethrough and down through said heater tubes, each of said heater tubes being packed with granular refractory material of between about ½ and 1-inch mesh and means including a series of horizontal baffles to pass the feed water through said heater.

THE WEEK'S CONTRACT NEWS

Relating to Municipal and Public Work—Street Improvements—Paving, Road Making, Cleaning and Sprinkling—Sewerage, Water Supply and Public Lighting—Fire Equipment and Supplies—Bridges and Concrete Work—Sanitation Garbage and Waste Disposal—Police, Parks and Miscellaneous—Proposals and Awards.

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also corrections of any errors discovered.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK.	ADDRESS INQUIRIES TO
			STREET IMPROVEMENTS	
Arkansas	Helena	Feb. 2	Constrn. 20,000 yds. brick pavement	E. A. Kingsley, Eng.
Idaho	Boise City	Feb. 2, 2 p.m.	**Constrn 328,200 sq. yds. asphalt concrete, bitulithic, Hassamite, plain concrete, concrete with cement top, granocrete, Hassam or brick pavement**	Karl Paine, Pres. Bd. Pub. Wks.
Wisconsin	Racine	Feb. 3, 10 a.m.	Constrn. 10,900 yds. paving, concrete curb and gutter	P. H. Connolly, City Eng.
Iowa	Kiron	Feb. 3, 10 a.m.	Road work for Stockholm township	E. M. Sandstrom, Clk. Bd. Superv.
Iowa	Murray	Feb. 3	County road work for 1912	Chas. Burges, Clk. Bd. Trustees.
Mississippi	Hazelhurst	Feb. 5	Constrn. 35 miles gravel road	County Commissioners.
Iowa	Sigourney	Feb. 5	Road work for 1912	W. F. Miller, Clk. Bd. Trustees.
Indiana	Delphi	Feb. 5, noon	Grading, draining and improving roads (3 contracts)	M. G. Haun, Auditor.
Michigan	Muskegon	Feb. 5, 8 p.m.	Constr. 3,500 sq. yds. tarvia, asph. macad. or brk. on conc. base.	B. H. Tellman, City Recorder.
Indiana	Decatur	Feb. 5, 10 a.m.	Constrn. 5 macadam roads	H. S. Michaud, County Auditor.
Indiana	Brownstown	Feb. 5	Constrn. 5,450 ft. road	County Comm.
Indiana	Kentland	Feb. 5, 2 p.m.	Constrn. macadam roads in Colfax Township	E. R. Bringham, County Aud.
Kentucky	Louisville	Feb. 5	Resurfacing asphalt streets; cost, $34,000	Board of Public Works.
New York	Auburn	Feb. 5, 8 p.m.	Pavg. East Genesee street	E. C. Aldrich, City Eng.
Georgia	Atlanta	Feb. 5	Improvg. various streets	R. M. Clayton Chief of Construc.
Alabama	Montgomery	Feb. 6, noon	Constrn. sidewalk with tile or cement, including curbs, gutters, walls, sewers, etc	Robt. Tait, City Treas.
Connecticut	New Britain	Feb. 6, 5 p.m.	Paving 2 streets	Board of Public Works.
Indiana	Vincennes	Feb. 6, 2 p.m.	Constrn. gravel roads	J. T. Scott, County Auditor.
Indiana	Monticello	Feb. 6, noon	Gradg., draining and paving with stone	A. B. Fisher, County Aud.
Indiana	Covington	Feb. 6, 1.30 p.m.	Constrn. highway in Shawnee Township	W. B. Gray, County Aud.
Connecticut	Hartford	Feb. 6	Paving several streets	Board of Pub. Wks.
New York	New Rochelle	Feb. 6, 3 p.m.	Furn. 100,000 gal. asph. road oil, 25,000 asph. pavg. blocks	Jos. Walter, Comm. of Streets.
Indiana	Bedford	Feb. 6, 1 p.m.	Constrn. gravel or macadamized roads	Board of Commissioners.
Canada	Hamilton, Ont.	Feb. 6	Furn. asph., road oil, brick, creosoted wooden blocks	G. H. Lees, Mayor.
Iowa	Eldora	Feb. 6	Constrn. 25,000 sq. yds. pavement	L. J. Stout, City Clk.
Indiana	Lawrenceburg	Feb. 6, noon	Constrn. 27,000 ft. stone road	W. S. Fagaly, County Aud.
Indiana	Logansport	Feb. 6, 10 a.m.	Constrn. macadam roads	J. F. Wallace, County Aud.
Indiana	Rensselaer	Feb. 6, 3 p.m.	Constrn. macadam road; cost, $26,345	I. P. Hammond, County Aud.
Indiana	Lafayette	Feb. 7, 10 a.m.	Constrn. 3 gravel roads	G. W. Baxter, County Aud.
Alabama	Grove Hill	Feb. 7, 2 p.m.	Gradg., draining & resurfacing with clay 6 miles road	County Commissioners.
Kentucky	Louisville	Feb. 7, 2 p.m.	Paving with brick 7 contracts	Board of Public Works.
Florida	Daytona	Feb. 7, 2 p.m.	Improvg. roads; cost, $200,000	C. M. Rogers, City Eng.
Indiana	Bloomington	Feb. 6, 2 p.m.	Constrn. road	Horace Blakely, County Aud.
New York	Brooklyn	Feb. 7	Furn. 2,000 tons refined asphalt	A. E. Steers, Pres. B'klyn Boro.
Florida	Ft. Pierce	Feb. 7, 2 p.m.	Constrn. 60 miles of hard surface road	County Clerk.
Mississippi	Jackson	Feb. 8, 10 a.m.	Constrn. sand and clay road	Highway Commissioners.
Florida	Jacksonville	Feb. 10	Pavg. with Miami rock the Mayport road	G. L. Barnard, County Eng.
Kentucky	Louisville	Feb. 8	Paving with brick Tenth street; cost, $5,800	Board of Public Works.
Virginia	Tazewell	Feb. 13	Constrn. 113 miles road	County Commissioners.
Kentucky	Mt. Sterling	Feb. 14, 7 p.m.	Constrn. 12,060 yds. brick on concrete	H. M. Ringo, City Clk.
Georgia	Rome	Feb. 14	Improving certain streets	R. A. Denny, Chm.
Maryland	Baltimore	Feb. 14	Pavg. with sheet asphalt about 16 streets	Board of Awards.
Kentucky	Louisville	Feb. 14	Reconstrn road; cost, $5,600	Board of Public Works.
Tennessee	Jonesboro	Feb. 15	Constrn. 21 miles highway	County Eng. Huffaker.
Ohio	Steubenville	Feb. 15, noon	Gradg., sewering and macadamizing turnpike	H. M. Bell, Commiss.
Canada	Saskatoon	Feb. 16	Constrn. 125,000 yds. pavement, also 621,000 sq. ft. concrete sidewalk and 101,000 ft. curbing	G. T. Clark, City Eng.
Florida	De Funiak Spgs	Feb. 17	Constrn. 120 miles roads	County Commissioners.
Indiana	Marion	Feb. 29	Constrn. roads between Grant and Wabash counties	County Commissioners.
Kentucky	Tompkinsville	Mar. 8	Constrn. 4 miles pike road	B. L. Bradshaw, Chair. Road. Com.
Ohio	Richwood	Mar. 9, 2 p.m.	Grading, draining, curbing and paving street	Otto T. Boggs, Village Clk.
Chile	Santiago	Mar. 10, 10 a.m.	**Constrn. 70,000 meters asphalt pavement**	City of Santiago.
Louisiana	Shreveport	April 1	Furn. 60,000 tons hard rock or gravel	J. T. Bullen, Parish Engineer.
			SEWERAGE	
Ohio	Columbus	Feb. 2, noon	Constrn. sewers in several streets	Sam'l A. Kinnear, Dir. Pub. Serv.
Georgia	Atlanta	Feb. 5	Furn. 60 miles vitr. pipe, 3,000 bbls. cement, steel castings and laying 60 miles sewers	R. M. Clayton, Chief of Constrn.
New York	Auburn	Feb. 5, 8 p.m.	Constrn. 1,700 lin. ft. sewers and 12 storm water inlets	J. S. Hanlon, City Clk.
Alabama	Bay Minette	Feb. 5	Furn. 1,200 ft. 24-in. vitrified sewer pipe	W. D. Stapleton, Mayor.
New York	Niagara Falls	Feb. 6, 7.30 p.m.	Constrn. 6 sewers	F. S. Parkhurst, Jr., City Eng.
Missouri	Columbia	Feb. 6	Constrn. 6 to 12-in. pipe sewer; cost, $8,500	J. R. Ellis, City Eng.
Iowa	Davenport	Feb. 6, 2 p.m.	Constrn. sewer	Board of Public Works.
New York	Niagara Falls	Feb. 6, 7.30 p.m.	Constrn. several sewers	T. H. Hogan, City Clk.
South Dakota	Mitchell	Feb. 5, 8 p.m.	Constrn. 4,000 ft. 8-in. pipe and appurtenances	N. H. Jensen, City Auditor.
New Jersey	Summit	Feb. 6	Constrn. 1,300 ft. 8-inch clay pipe sewer	J. S. Steiger, City Engineer.
Maryland	Baltimore	Feb. 7	Constrn. contract No. 79, including 10,500 ft. 8 to 15-in. clay pipe and 6,000 ft. house connections	Chas. England, Chm. Sewerage Com.
Indiana	Kendallville	Feb. 7, 6 p.m.	Constrn. district sanitary sewer; estimated cost, $13,312.25	W. P. Myers, City Clk.
Ohio	New Phila	Feb. 8 (changed date), noon	Constrn. sanitary sewer and siphon line	T. L. Aughinbaugh, Clk.
Ohio	Salem	Feb. 14, noon	Constrn. disposal plant	D. H. Rummell, Dir. Pub. Serv.
Kansas	Girard	Feb. 15, 2 p.m.	Constrn. sanitary sewers and sewerage disposal works	Burns & McDonnell, Engs.
S. Dakota	Madison	Feb. 15, 8 p.m.	Constrn. sewage system and disposal works	G. H. Waskey, Mayor.
Pennsylvania	Scranton	Feb. 15	Constrn. several sewers	City Clerk.
Missouri	Hannibal	Feb. 15	Constrn. 25,000 ft. concrete and vitrified pipe sewer	W. Y. Youse, City Clerk.
South Dakota	Madison	Feb. 15	Constrn. sewage disposal works	Wm. Rae, City Auditor.
New York	Watervliet	Feb. 15, 2 p.m.	Constrn. dams and conduits for storm sewer system	Watervliet Storm Sewer Comm.
Arkansas	Pine Bluff	Feb. 17, 8 p.m.	Constrn. system of sanitary sewers	T. A. Wilson, Chm. Sewer Dist.
Dist. Columbia	Washington	Feb. 19, 10 a.m.	Furn. water meters, garbage cans, etc	F. C. Boggs, Gen'l Purch. Agent.
Iowa	Tipton	Feb 20	Constrn. 10½ miles of sewers and disposal plant	City Clk. & Ia. Eng. Co., Clinton, Ia.
Ohio	Kennedy Hghts	Feb. 20, noon	Constrn. sanitary sewers (2 contracts)	H. Appleton, Vil. Clk., 1112 Traction Bldg., Cincinnati.
Missouri	Hannibal	Feb. 29, noon	Constrn. 19,500 ft. 6 to 12-in. pipe sewers and 4,100 ft. concrete box; estimated cost, $37,000	B. F. Smiley, City Engineer.
Indiana	Gary	March 1 (about)	Constrn. sewers, cost $150,000	City Clerk.
Indiana	Laporte	Mar. 1	Constr. 6,000 ft. 24 to 48-in. reinfcd. conc. pipe; cost, $75,000	W. C. Shoecraft, City Eng.
Hawaii	Pearl Harbor	Mar. 30, 11 a.m.	Constrn. sewer system Pearl Harbor	Navy Dept., Washington, D. C.
Texas	Clarksville	April 1 (about)	Constrn. 8 miles sewers, cost $25,000	J. R. Webb, City Clerk.

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
WATER SUPPLY				
California	Monrovia	Feb. 5, 5 p.m.	Constrn. 5,620 ft. riveted steel water pipe	C. H. Reed, Jr., City Clk.
Canada	Hamilton, Ont.	Feb. 6	Furn. c. i. pipe, valves, hydrants, boxes, lead, sewer pipe, sewer brick, castings, etc	G. H. Lees, Mayor.
Idaho	Preston	Feb. 5	Constrn. water works, cost $75,000	M. Larsen, Mayor.
Oklahoma	Talihina	Feb. 6, 6 p.m.	Building complete water works system, including gasoline driven triplex pumps	J. E. Emmert, Pres, Board.
Massachusetts.	Boston	Feb. 6	Furn. 2,770 tons c. i. water pipe and 25 tons specials	J. E. Mullen, Dept. of Supplies.
New Jersey	Perth Amboy	Feb. 7, 3 p.m.	Constrn. 30-in. water main	S. J. Mason, Eng.
Minnesota	Duluth	Feb. 8, 4 p.m.	Furn. c. i. water and gas pipes, corporation and curb cocks, galvanized iron pipe & fittings, gas curb boxes	L. N. Case, Mgr.
Missouri	Mountain Grove.	Feb. 12	Constrn. water works system	W. S. Chandler, Mayor.
South Carolina	Columbia	Feb. 14, noon	Repairg. water power pump, plant, including resetting pumps on new foundations, new shafting, pedestals, etc	W. F. Stieglietz, Council Supt.
Alabama	Tuskegee	Feb. 14	Completing water supply system for institute	R. P. Taylor, Director.
Minnesota	Stillwater	Feb. 15	Constrn. steel stand-pipe	Bd. Water Comm.; L. W. Clark, Eng.
Nebraska	Ft. Omaha	Feb. 15	Constrn. filtration plant	Col. J. L. Clem, Ch. Q. M., Chicago, Ill.
New York	Manhasset	Feb. 15, 8 p.m.	Constrn. 2 8-in. wells, brick pumping station, 3 sets fuel oil engines, triplex pumps and accessories, water tower, 21 miles c. i. pipe, hydrants, valves, etc	Water Comm.
Indiana	Newcastle	Feb. 18	Furn. 350 tons c. i. water pipe, 5 tons specials, 5 tons lead, 450 lbs. hemp; also furn. & erect. 3,000,000-gal. pump. eng.	L. M. Johnson, City Clk.
Georgia	Macon	Feb. 19, noon	Furn. lead, jute and labor for laying 3,300 tons c. i. pipe, also setting valves and hydrants; constrn. reservoir	W. H. Fetner, Chm. Committee.
Wisconsin	Cumberland	Feb. 27	Laying 4-in. water main	Committee on Fire and Water.
Wisconsin	Durand	Mar. 1 (about)	Constrn. 16,000 ft. mains & reinforced concrete reservoir	City Clerk.
Canada	Winnipeg, Man.	Mar. 1	Furn. 5,000,000-gal. turbine pump, motor-driven	R. D. Waugh, Mayor.
Kentucky	Henderson	March 2	Furn. plans for filtration plant	W. I. Thompson, Mayor.
LIGHTING AND POWER				
Tennessee	Lexington	Feb. 8	Constrn. electric light plant, water works and sewerage system, one 100 and one 150-KVA generator	C. G. Gathings, Mayor.
Ohio	Elyria	Feb. 12	Constrn. transmission lines with poles 1 mile long; furn. transformers, meters, switches, etc	County Commissioners.
Indiana	Garrett	Feb. 13	Furn. steam engine-driven gener., 150-KVA switchboard, etc.	W. W. Mountz, City Clk.
N. Carolina	Littleton	Feb. 15, 8 p.m.	Constrn. electric light plant	T. J. Miles, Mayor.
Nebraska	Elk City	Mar. 1, (about)	Constrn. power plant at Elk City	W. E. King, Ch. Eng., Omaha.
FIRE EQUIPMENT				
Minnesota	Little Falls	Feb. 5 8 p.m.	Furn. 1,000 ft. 2½-in. cotton fire hose	Fred Cary, City Clk.
Montana	Anaconda	Feb. 5	Furn. auto-propelled comb. chem. hose wagon & ladder truck.	S. G. Taylor, City Clk.
Louisiana	Lake Charles	Feb. 6, 8 p.m.	Bldg. 2-story brick fire station	C. B. Richard, Mayor.
California	Eureka	Feb. 6, 8 p. m.	Furn. automobile combination chemical and hose wagon	City Clerk.
Minnesota	Cass Lake	Feb. 6, 8 p.m.	Furn. 700 ft. 2½-in. fire hose	D. F. Dumas, Pres. Village Council.
Ohio	Lakewood	Feb. 21,noon	Furn. comb. automobile chemical and hose wagon	J. H. Brown, Dir. Public Safety.
BRIDGES				
Washington	Spokane	Feb. 2, 2 p.m.	Constrn. county bridges	County Commissioners.
Ohio	Mediana	Feb. 3, 11 a.m.	Constrn. superstructure of highway bridge	L. F. Garver, County Aud.
Indiana	Newport	Feb. 5, 10 a.m.	Constrn. two bridges	H. T. Payne, County Aud.
Indiana	Rensselaer	Feb. 5, 2 p.m.	Constrn. 4 steel bridges	County Comm.
Indiana	Decatur	Feb. 5, 10 a. m.	Constrn. bridge	H. S. Michaud, County Auditor.
Minnesota	Duluth	Feb. 5	Constrn. bridge over Pike River	County Commissioners.
South Dakota	Bellefourche	Feb. 6, noon	Constrn. wooden and steel bridges during 1912	D. C. Barr, County Aud.
Florida	Jacksonville	Feb. 7, 10 a.m.	Furn. and driving fender piling	G. L. Barnard, County Eng.
Minnesota	Hallock	Feb. 7	Constrn. 2 steel bridges and 4 large culverts	C. J. Hemmingson, County Aud.
Nebraska	Nebraska City	Feb. 8, noon	Constrn. bridges	L. J. Stutt, County Clk.
Illinois	Greenup	Feb. 10, 1 p.m.	Constrn. reinforced concrete viaduct	George Walters, Actg. Town Clk.
Ohio	Fremont	Feb. 10	Constrn. 9 reinforced concrete bridges	P. G. Hasback, County Aud.
Illinois	St. Jacob	Feb. 10, 2 p.m.	Constrn. 3 reinforced concrete bridges	W. P. Sweeney, Town Clk.
Nebraska	Schuyler	Feb. 12, noon	Constrn. steel, concrete and wooden bridges	E. F. Vrzak, County Clk.
New Jersey	Freehold	Feb. 14, 11 a.m.	Scraping and painting bridge	J. M. Corlies, Director of Bd.
Pennsylvania	Scranton	Feb. 15	Constrn. reinforced concrete culvert	City Clerk.
Oregon	Portland	Feb. 16, 4 p. m.	Constrn. reinforced concrete viaduct	A. L. Barbur, City Auditor.
Ohio	Cincinnati	Feb. 16, noon	Constrn. concrete bridge	Stanley Strouble, Pres. Co. Comm.
Ohio	Chillicothe	Feb. 19	Constrn. bridge	R. D. Alexander, County Aud.
Minnesota	Minneapolis	Feb. 19, 11 a.m.	Bldg. 3 bridges	A. P. Erickson, County Aud.
Nebraska	Kearney	Feb. 19, noon	Constrn. bridges and repair work during 1912	I. H. Dean, County Clk.
Nebraska	Bridgeport	Feb. 20, noon	Constrn. bridges	County Commissioners.
New Jersey	Trenton	Feb. 20	Constrn. bridge	County Comm.
New Jersey	Trenton	Feb. 20	Constrn. pier and sewer flume	City Clerk Salter.
Indiana	Bluffton	Apr. 1 (about)	Constrn. 8 concrete bridges and box culvert	L. A. Williamson, County Aud.
Minnesota	Winona	Apr. 9	Constrn. 80-ft. steel truss bridge	County Auditor.
MISCELLANEOUS				
Wisconsin	Milwaukee	Feb. 2, 5 p.m.	Furn. 2-passenger roadster	F. R. Harbach, Sec. Bd. School Dir.
Indiana	Fort Wayne	Feb. 5, 3 p.m.	Furn. stationary asphalt repair plant, capacity 300 to 500 sq. yds., 2-in. topping per day; also 5-ton tandem steam roller.	H. W. Becker, Clk. Bd. Pub. Wks.
Virginia	Portsmouth	Feb. 6, noon	Erecting municipal building	Public Property Committee.
Illinois	E. St. Louis	Feb. 7, noon	Constrn. concrete tunnel, 9x7 ft. 95 ft. long	H. D. Sexton, Pres. Trustees.
Massachusetts.	Boston	Feb. 7, noon	Furn. 190 tons square cold twisted rods and 10 tons square plain rods, open-hearth steel	B. L. Beal, Sec. Boston Transit Com.
Massachusetts.	Boston	Feb. 7, 10 a.m.	Furn. 50,000 bbls. Portland cement	B. L. Beal, Sec. Boston Transit Com.
New Jersey	Jersey City	Feb. 7, 8 p.m.	Constrn. jetty on beach front	E. S. Royal, City Clk.
New Jersey	Allendale	Feb. 15, 8 p.m.	Furn. plans, surveys and specifications for grading and macadamizing all roads in the borough	H. C. Anthony, Boro. Clk.
Maine	Portland	Feb. 16, noon	Furn. 1,500 portable seats and 1,600 opera chairs	City Hall Bldg. Commission.
Kansas	Topeka	Feb. 19	Furn. road roller and grader	Board County Commissioners.
West Va	Wheeling	Feb. 20, 11 a.m.	Furn. 25,000 bbls. Portland cement	F. W. Altstaetter, Major Eng.

STREET IMPROVEMENTS

Tuscalossa, Ala.—Board of Trade have had plans prepared for construction of new road, from Warrior River to business center of town. Cost $8,500 or $5,000, according to width.

Los Angeles, Cal.—Plans are being discussed for construction of State highway from Los Angeles to El Centro.

San Francisco, Cal.—Street Committee of Supervisors favors putting streets in central part of city in good shape first.

South Pasadena, Cal.—Board of City Trustees has adopted resolution of intention in regard to proposed improvement of Oak st., from Wayne to Garfield aves.

Hartford, Conn.—It has been voted to appropriate $20,000 for work on highways and macadam roads.

Jacksonville, Fla.—Plan is being considered for improvement and development of Adams st. as crosstown thoroughfare.

Jacksonville, Fla.—At special meeting of County Commissioners road matters were considered as follows: Bid of John K. Marvin for clearing and grubbing road 40 ft. wide, from Youkon to encampment grounds, at $35 per acre and 19 cents per yd. for grading, was referred to County Engineer. Three bids were received for paving Mayport rd. with coquina or Interlachen gravel, and were all rejected, as being excessive. Bids were invited, upon motion of Commissioner Holmes, for hardsurfacing Mayport rd., 15 ft. wide, from where it intersects Atlantic blvd., to the city limits of Mayport. This to be of loose oyster shells 8-in. thick, with top dressing of Georgia gravel, 3-in. thick. Bids for paving same thoroughfare with Miami rock, with average of 8-in. thickness were also asked for.

Augusta, Ga.—Asphalt macadam pavement will be laid on May ave. Brick will be laid in Telfair st. Paving for 12th st. not decided.

Macon, Ga.—Alderman A. L. Dasher has introduced a resolution in Council providing for constructing pavement, sidewalk and curbs in every street in the city.

Indianapolis, Ind.—Board of Turnpike

Directors have decided to spend $87,103 on free gravel roads in Warren County.

Portland, Me.—A boulevard extending for nearly a mile along the former right of way of Worcester, Nashua & Portland Railroad, from Bedford st. almost to Woodfords Corner, is the proposal which has been brought to the attention of Park Commissioner James P. Jordan and several members of City Government. Henry Deering is interested.

Michigan City, Ind.—Engineer Miles has been instructed to prepare plans and specifications for paving Hermatage ave. with brick.

Newcastle, Ind.—City Council has decided at special meeting to-day to call halt on prospective street pavements. Fund for pavement of street intersections is about exhausted. Rule was adopted to pave three streets each year after 1912. Six thoroughfares will be paved this year.

Eagle Grove, Iowa—Broadway and portions of Lucas and Commercial aves. will be paved this summer.

Sioux City, Ia.—Resolution is being considered for improvement of Jackson st., from 30th to 39th st.

Glasgow, Ky.—No bids have been received for building 4 miles of pike between Tompkinsville and Otia. They will advertise for bids on the same pike in the spring.

Baltimore, Md.—With the adoption of standard set of specifications for paving and selection of 8 miles of street to be paved out of $5,000,000 loan. Paving Commission is now ready for most active year in city's history in matter of paving. Eight miles of street to be paved through contracts to be let in few weeks are looked on by Commission as its first real work. Closely following these contracts, eight more miles of streets are to be paved. Second lot of streets has been selected by Mr. Compton and will be passed upon at Commission's meeting. By March 1 it is hoped to have contracts for second eight miles awarded. By May 1 at latest Commission expects to have about nine or 10 miles of streets ready to make up third batch of paving contracts, and by May 15 it is hoped to have contracts for this work awarded. These three batches of contracts will represent about 25 miles of streets, and these, according to Chairman Compton, constitute approximate amount of paving to be done by Paving Commission this year. These 25 miles of improved paving will be laid for about $1,500,000, which represents issue of $500,000 of paving loan made in 1911, and another issue of $1,000,000 to be made this year. By law only $1,000,000 of loan can be issued each year.

Rockville, Md.—Petition is being circulated requesting County Commisioners to hold bond election for $50,000 to assist the Chevy Chase to Great Falls Land Co. to conduct a boulevard 9 miles long.

Arlington, Mass.—Selectmen will also be authorized to petition Metropolitan Park Commission for extension of present boulevard across Medford st. and along south shore of lower Mystic Lake, through Meadow Brook Park, to point on Mystic st. opposite Summer st. To straighten Sucker Brook $200 will be sought.

Boston, Mass.—For second time within six weeks Boston City Council has rejected proposition advanced by Mayor to provide loan for extension of Arlington st. to Columbus ave.

Lynn, Mass.—Nearly half a million dollars will probably be expended upon streets and sidewalks and sewers of city in 1912.

Lynn, Mass.—Commissioner McPhetres asks for $50,000 to pay for relaying of granite block paving as follows: Washington st., 13,040 sq. yd.; Summer st., 12,470 sq. yds.; Monroe st., 3,060 sq. yds.; Lewis st., 2,278 sq. yds.; Broad st., 6,480 sq. yds.; Chestnut st., 510 sq. yds.; Union st., from Central sq. to School st., 10,000 sq. yds.; Essex st., 3,173 sq. yds.; Federal st., 2,833 so. yds.

Alma, Mich.—A proposition submitted to citizens to bonding the city for $30,000 for paving main street was carried.

Jennings. Mich.—Bonding proposition for Lake Township, which was voted for $12,000 for improvements on roads for next two years, has been carried.

West Duluth, Minn.—City Engineering Department is making estimate on cost of paving Oneota st., from 46th to 36th aves. west, Jenswold st. and Superior st., from intersection to 25th ave. west.

St. Louis, Mo.—Board of Public Improvements is considering improving and reconstructing various streets.

Kearney, Neb—City Clerk George E. Ford has been directed to draw up petitions for presentation to Council asking for ordinance submitting proposition to issue $40,000 bonds for light plant to people. Installation of 90 horse-power oil engine and five light standards is proposed.

Omaha, Neb.—Plans for construction of boulevard from Grand ave. to Carter Lake Park have been considered by Park Commissioners. Map of most feasible route has been prepared, showing appraised damage of property affected to be about $13,700.

Ballinger's Mills, N. J.—State Road Department has set aside $6,000 for road to Piper's Corner.

Collingwood, N. J.—Efforts will be made to have Legislature legalize issue of $50,000 street improvement bonds which have been declared void.

Gloucester, N. J.—No bids were received by Collector George E. Pierson for $40,000 road improvement bonds.

Mt. Airy, N. C.—A. E. Smith, Chairman Highway Commission, wishes someone to grade and build roads in township that has the tools and stock to do the work. There are about 50 miles of road to build, work to commence March 1.

Fargo, N. Dak.—Paving of several streets with creosoted blocks will be readvertised, owing to discovery of an alleged illegal clause in specifications.

Newark, N. J.—Resolution has been adopted for paving of various streets.

Newark, N. J.—Petition will be presented to Board of Works asking for paving of Hawthorne ave., Schley, Wainwright, Leslie and other streets.

Newark, N. J.—Acting on suggestion by County Counsel Griffin, of Hudson, Committee has decided to replank northerly side of road between Passaic and Hackensack bridges temporarily, or until improvement on south side is completed. Planks will be put over concrete laid to provide partial foundation for new roadbed.

Paterson, N. J.—City plans to spend $256,972 in street improvements, as follows: Permanent Streets—Ellison st. extension and Spruce st., $17,850; Mill st., $11,000; Market st., $37,980; Clay st., $20,520; Main st., $9,000; Beech st., $11,300; Harrison st., $1,500. Permanent Street Repairs—Paterson st., $12,849. Semi-Permanent Streets—Newark ave., $2,449; Lawrence st., $1,388; Montgomery st., $1,388 East 22d st., $2,175; Lake st., $2,100; West 28th st., $1,650. Semi-Permanent Repairs—Hamilton ave., $1,600. Cobble Stone Paving—Halpine st., $875. Old Block Paving—Waite st., $5,000. Oiling—On various streets, $4,000. Macadam Paving—Branch st., $675; East 32d st., $650; Front st., $675; Fair st., $1,350; Hamilton ave., $1,400; Paterson ave., $625; Paxton st., $800; Sussex st., $800. Grading, Curbing and Guttering—On various streets, $56,248. Lateral Sewers—On various streets, $50,000. Total improvements for 1912, $256,972.

Boonville, N. Y.—Paving is the leading topic of conversation. It is stated that State authorities recommend brick.

Brooklyn, N. Y.—Borough President Connolly, of Queens, has asked for sum of $750,000 for repairing streets, and for improvement of borough highways, he asks $1,500,000.

Buffalo, N. Y.—Bids will be received until 12 noon, Feb. 2, by William G. Justice, City Comptroller, Room 3, City and County Hall, for purchase of $150,000 and $100.000 registered grade crossing bonds, $200,000 registered school bonds, and $95,000 registered Park bonds.

Canandaigua, N. Y.—Town Board of Canandaigua is investigating feasibility of changing west lake shore highway that crosses Tichnor Hill, where grade of 17½ per cent. makes travel difficult and dangerous at all seasons. Improvements contemplated will require long fill across glen and concrete bridge. West lake road carries heavy traffic during summer season. Improvements will cost, it is estimated, nearly $4,000.

Cortland, N. Y.—Between 30 and 40 miles of State and County highway are included in the State's plans for improvement during the coming summer. Roads include section of trunk road No. 9 extending from Cortland city limits to Virgil, and thence to Dryden, a distance of nine miles; section of trunk road No. 10, from McGraw easterly through Solon toward Greene, a distance of 11.6 miles, and upwards of 13 miles of country highway in the towns of Cortlandville, Harford and Truxton.

Fulton, N. Y.—State will build three miles of road, part brick, part macadam, 16 ft., 20 ft. and 24 ft. wide in various sections.

Hudson, N. Y.—Council is considering repaving Warren st. with vitrified brick, about 10,000 sq. yds.

Newburgh, N. Y.—New steam roller, grading machine and street sweeper will be purchased.

Port Jervis, N. Y.—Mayor W. H. Nearpass has recommended the purchase of a 10-ton road roller, to cost not over $3,000.

Port Jervis, N. Y.—Sum of $5,000 has been placed in highway fund for paving, including macadam, with asphalt binder.

Pulaski, N. Y.—William J. Peach, Village President, wants to pave the business section with brick.

Saratoga Springs, N. Y.—Board of Trustees of Village and Town Board of Town have adopted resolutions favoring building of State highway through village to connect two State roads at north and south ends of village.

Syracuse, N. Y.—Plans for construction of upwards of 320 miles of improved roads in this highway division are being prepared under supervision of Division Engineer Frederick S. Strong in State Highways Department office. Plans are also being prepared for construction this year of about 15 miles of improved highways in this county, to be built at expense of State, county and towns.

Yonkers, N. Y.—Public hearings are being held on various street opening projects.

Genoa, O.—George Chambe, Consulting Engineer, Toledo, O., has been engaged to prepare plans for paving Main st.

Dayton, O.—In view of action taken by Board of Control, relieving contracting firm of Warren Brothers from their obligation assumed in accepting contract for paving of North Main st., from Curtis ave. to corporation line, readvertisement will be made.

Niles, O.—Work of Street Committee has proposed motion that engineer be instructed to prepare plans and specifications for paving following streets: South Main, North Main, Beaver st., Linden st., Church st., Mill st., Franklin alley, Chestnut st., Mechanic st., Cedar st., and 3d st.

Youngstown, O.—Grading of Valley st., from Albert to Andrews ave. and paving of Penn ave., from Himrod to Oak st. have been requested.

Altoona, Pa.—Repairing of paving of 12th ave. is being considered.

Butler, Pa.—Ordinance is pending providing for an elevated public street, from Wayne st. to Fairview ave.

Erie, Pa.—Widening of State st. to new public dock is recommended by Mayor.

Bristol, Tenn.—With voting recently of $200,000 bonds for extension of pikes now under construction, including Sullivan County section of Memphis-to-Bristol highway, Sullivan County has so far voted total of $500,000 to good road work.

Chattanooga, Tenn.—Bids will be received until noon, Feb. 10, at office of County Judge in Municipal Bldg., for purchase of $65,000 worth of Lookout Mountain road bonds.

Providence, R. I.—An appropriation of $250,000 to be used by the State Board of Public Roads in addition to the $600,000 bond issue, is provided in a resolution introduced in the Senate by Oscar A. Bennett, of Woonsocket.

El Paso, Tex.—Bids will be advertised for paving Hawthorne st.

El Paso, Tex.—Arizona st. has been ordered paved from Oregon st. to Newman st., and bids were ordered advertised.

Port Aranson, Tex.—City Commission will grade and straighten streets, build sidewalks and construct boulevard to the beach.

San Antonio, Tex.—The Traction Company will spend $90,000 in paving during year.

Provo, Utah—City Commissioners will draw up ordinance to pave Academy ave.

Norfolk, Va.—Business men are asking for the widening of Church st.

Spokane, Wash.—City Engineer Morton Macartney has submitted plan for street through Union Park district, to cost $165,000, or a means of flood prevention. Alteration plans call for an open ditch at a cost of $70,000, of 15-ft. ditch and dry rock wall at cost of $77,290.

Delevan, Wis.—City Engineer is preparing plans and specifications for 11 blocks of bituminous macadam. A. B. Hare, Mayor; Ray Bowers. City Clerk.

Milwaukee, Wis.—County will purchase $20,000 worth road machinery and build roads by day labor system.

CONTRACTS AWARDED

Birmingham, Ala.—By City Commission to McCartin Constructing Co., for paving of 30th st., from Highland to Highland ave. with bitulithic, at $1.25 per sq. yd.

Hamilton, Ala.—By Marion County Board of Commissioners for construction of pike road, from Hamilton to Guni for sum of $17,350, to A. B. Beardeau, of Birmingham.

Lodi, Cal.—For paving streets in city, to City Street Improvement Co.

Riverside, Cal.—By City Council for constructing fill across Terquesquite Arroyo, 100 ft. in width at top, and approximately 1,000 ft. in length, requiring approximately 142,000 cu. yds. of material, to Star Cement Co., 566 6th st., Riverside, for 17 7-10 cents per cu. yd.

Jacksonville, Fla.—To Mattair & Young by Board of Duval County Commissioners, Jacksonville, for paving of road from Atlantic blvd. to city limits of Mayport with Interlachen gravel. Contract price is 99½ cents per sq. yd.

Edwardsville, Ill.—By Board of Local Improvements for construction of pavements, to O. T. Dunlap, as follows: Fillmore-Buchanan Paving District, $27,466; Grand-Elm Improvement District, $10,986; Schwarz Paving District, $8,391; Union Connecting Improvement District, $5,939, and Park-Benton Paving District, $15,122. To G. R. Hyten was awarded paving of Commercial-College Paving District, at $4,010.

Anderson, Ind.—By Madison County Commissioners, for gravel road; two, to J. W. Sullivan; one, to J. E. Mason; five, to S. L. Walker, all of Alexandria, Ind.; one, to A. B. Huffman, Lapel, Ind.; one, to Madison Construction Co., 8th and Main sts.

Evansville, Ind.—By County Commissioners for county road contracts, to Jas. Wibbler and to Eichel Co.

Fowler, Ind.—By Board of Commissioners of Benton County, for construction of roads as follows: Pitstick rd., Nicolson & Pierce, care Board, $10,832. Snyder rd., George Matthews, at $7,157.

Logansport, Ind.—By Board of Commissioners of Cass County, for road improvements, as follows: Healey and Grace rds., to Walter Girton; Pierce and Cotner rds., to Martin McHale; Alles rd., to Harry A. Barnes & Son.

Michigan City, Ind.—Board of Public Works and H. W. Marshall, representing Western Construction Co., have signed contracts for paving three streets with asphalt.

Portland, Ind.—By Commissioners of Jay County, for grading, draining and paving H. W. Bortner macadam road, to Nicoson & Pierce, Alexandria, Ind., $15,250; County line road, to Teeters & Teeters, Portland, $25,487.

Vincennes, Ind.—By Board of Knox County Commissioners, for gravel road contracts: G. W. Shield rd., to H. F. Jones, Vincennes; E. T. Caine rd., Decker Township, to Columbus Hargrove, Decker, Ind.; H. J. Byers rd., Washington Township, to Lewis Phillips, Bicknell, Ind.

West Terre Haute. Ind.—For 7,000 sq. yds. of vitrified brick paving, concrete curb and gutter, to Foulkes Contracting Co., 513 Trust Bldg., Terre Haute, Ind.

Council Bluffs, Ia.—By City Council for repaving of South Main st., from 1st to 16th ave., to E. A. Wickham & Co., for $2.04 per sq. yd., with asphalt filler at 19 cents per sq. yd. extra. Brick for improvement will be furnished by George D. Ouren Co., of Galesburg, Ill.

Waterloo, Ia.—By City, to J. W. Turner Improvement Co., Des Moines, for 8,686 sq. yds. paving on Bluff st., from 3d to 6th sts., at Waterloo.

Bastrop, La.—By Board of Aldermen, to H. O. Johnson, Oklahoma, Okla., for construction of approximately 1,358 lin. ft. of 8-in. walk, 600 lin. ft. 7-ft. walk, 3,735 lin. ft. 6-ft. walk, 19,738 lin. ft. 4-ft. walk, and 376 lin. ft. 4-ft. crossings.

Crowley, La.—To C. S. Jackson & Co., for constructing 118 concrete street crossings.

Cartersville, Mo.—By City Council, for construction of combined curbs and gutters on Main st., to W. W. Williams, of Joplin.

Beach Haven. N. J.—By Borough, for construction of boulevard, 100 ft. wide, to Elmer King.

Rochester, N. Y.—By Board of Contract and Supply, to Rochester Vulcanite Pavement Co., for asphalt pavement in Ridgeway ave., at cost of $48,122.

Dayton, O.—By City for improvement of Troy st., from Leo st. to corporation line to Boyd and Cook.

Toledo, O.—By City Board of Control, for paving of new market house on Erie st., to Asphalt Block Paving Co., which was low with bid of $11,207.30. Estimated cost of job was $13,631.70. Asphalt will be used. Five other Toledo firms bid as follows: Russell & Jennison Co., bid $12,877.30; Toledo Contracting Co., bid $13,585.07; M. F. O'Sullivan, bid $13,573.90; McKinney Bros., bid $12,333.95, and Patrick Watters & Son, bid $13,662.95.

Youngstown, O.—By Board of Control for street improvements as follows: North Walnut st., paving, Charles Harris, at $12,629; Plum st., grading, James Comiskey, $900; Glenaven ave., paving, Miller Bros., $4,073; Grace ave., paving, Miller Bros., $6,952.

Youngstown, O.—By Commissioners of Mahoning County, to Ross O'Rourke, West Austintown, O., at $9,363.10, for construction of 1½ miles of macadam road.

Youngstown, O.—By Board of Control to Kennedy Bros., at $4,773, for repaving Hazel st., from Boardman to Commerce sts.

Ponca, Okla.—To Young Bros. Construction Co., St. Joseph, Mo., for grading and paving with vitrified paving blocks portions of 3d st. and Grand ave., Ponca.

Binghamton, Tenn.—By Street Committee, to Hughey & McTighe, Memphis, Tenn., for paving and construction of concrete sidewalks.

Brownsville, Tenn.—By Street Commission, to J. H. Halliburton, city, for grading and graveling certain streets.

Galveston, Tex.—By Commissioners, to Kelso & Vantrin, for 4-in. concrete base under brick pavement, at 88 cents per sq. yd.

Greenville, Tex.—To Creosoted Wood Block & Paving Co., Gulfport, Miss., at $1,500, for paving W. Lee st.

Everett, Wash.—To R. M. Westover, by County Commissioners, Everett Wash., for remainder of Everett-Edmonds-Seattle rd., for $6,297.

Seattle, Wash.—By Board of Public Works, to Lane & Dilley, at $27,525.50, for grading 9th ave. W., et al.

BIDS RECEIVED

Jacksonville, Fla.—For paving road from Atlantic blvd. to city limits of Mayport with coquina concrete or Interlachen gravel as follows: F. M. LeGate, of Jacksonville, $1.07 per sq. yd. for Interlachen gravel; Logan Concrete & Engineering Co., Jacksonville, coquina concrete, $1.19 per sq. yd.; Interlachen gravel, $1.05 per sq. yd.; Mattair & Young, Jacksonville, 99½ cents per sq. yd. for Interlachen gravel.

Louisville, Ky.—For paving of Bardstown rd., from Bonnycastle ave. to Douglas blvd., with asphalt paving, granite stringers and vitrified block gutters. Work will cost approximately $50,000. There were three bidders. The American Standard Asphalt Co. bid $1.90 a sq. yd. for asphalt; Louisville Asphalt Co., $1.95, and the Barber Asphalt Paving Co., $2. The bids are now being considered and contract for the work will be awarded later.

SEWERAGE

Los Angeles, Cal.—City Engineer has been instructed to prepare preliminary surveys and estimates for complete system of storm sewers.

Piedmont, Cal.—Construction of sewage disposal plant is under consideration.

Rio Vista, Cal.—Town Trustees have fixed March 5 as date for special election to vote upon proposition of issuing bonds in sum of $25,000 for construction of sewer system.

Bloomington, Ill.—City Engineer Elmer Folsom is preparing plans for 4 miles of 10-, 16- and 20-in. water mains. Cost, $67,000.

Sparta, Ill.—Board of Local Improvements of Sparta, consisting of Mayor, City Engineer and Street Commissioner, has passed resolution establishing sewer drainage district to be known as Sparta Sewer Drainage District No. 1. Complete survey of district has been made and cost of construction of sewer system for city will fully reach $79,770.30.

Sioux City, Ia.—Plans for storm water sewerage system covering portion of territory to be covered by proposed paving operations in Morningside are in preparation in office of City Engineer K. C. Gaynor, and will be submitted to Council at early meeting.

Morgan City, La.—Bids will be received by Chairman of Finance Committee up to noon Feb. 17, for purchase of $80,000 serial bonds of municipal corporation of Morgan City, for purpose of constructing sewerage and waterworks systems.

Lynn, Mass.—Nearly $500,000 will probably be expended upon sewers, streets and sidewalks of city.

Grand Rapids, Mich.—Petitions are being circulated for boulevard lighting system on Monroe, Canal, South Division and part of Michigan ave. Lee M. Bierce, Assistant Secretary Association of Commerce, is assisting in the movement.

St. Paul, Minn.—Assembly Committee on Streets has made report in favor of $150,000 bond issue for construction of sewers.

Herman, Mo.—Plans are being prepared by Burns & McDonnell for sanitary sewer and waterworks.

Nevada, City, Mo.—Trustees are considering building a municipal lighting plant.

Omaha, Neb.—Resolution to set aside $52,000 from the sewer fund, for construction of Saddle Creek storm sewer, has been passed.

Berlin, N. J.—Engineer Wm. H. Boardman, 426 Walnut st., Philadelphia, Pa., has plans for a system of waterworks for Berlin, to cost $25,000.

Long Port, N. J.—Committee will consult with State Board of Health about size of disposal plant needed.

Perth Amboy, N. J.—Smith St. White Way Association has selected the Excello lamp.

Newark, N. J.—Resolution has been adopted for construction of pipe sewers in various streets.

Oswego, N. Y.—At meeting of Common Council resolution offered by Alderman Knapke was adopted authorizing Mayor to appoint Sewer Commission, composed of not less than five and not more than nine residents of city, to devise and frame proper, adequate and comprehensive system of sewerage for both east and west sides.

Schenectady, N. Y.—Installation of sewage disposal plant is being considered.

Scotia, N. Y.—Proposition to change contract with Schenectady Illuminating Co. will be voted on. Object is to secure more light.

Oil City, Pa.—Council has granted franchise to Citizens Light & Power Co. to establish and maintain electric plant for 40 years.

Philadelphia, Pa.—Director Cooke is being urged to extend new 12th st. sewer under construction from Market to Chestnut st. to McHale st. or Locust if possible.

Hillsboro, Tex.—City of Hillsboro has sold to John R. Oldham, of Dallas, $5,000 worth of sewerage extension bonds. $10,000 debt liquidation bonds and $15,000 waterworks bonds.

CONTRACTS AWARDED

Little Rock, Ark.—By Commissioners of Sewer Districts Nos. 43 and 46, for improvement of septic tank at 19th and McGowan sts., to Nick Peay.

San Francisco, Cal.—By Board of Public Works for construction of Section C of Ingleside outlet sewer, to Contra Costa Construction Co., at $60,500.

Summerville, Ga.—By Village Council, to Dysard Construction Co., Atlanta, Ga., for construction of sewers.

Fort Wayne, Ind.—To Charles Rietdorf, 2411 Fox ave., by Board of Public Works for construction of following improvements: Sewer in and along alley, between Columbia ave. and Edgewater ave., from the brick sewer on Morton st. to alley east in Delta blvd. and in alley east of Delta blvd., from Columbia ave. to Edgewater ave.; sewer in and along the alley between Lake ave. and Tilden ave., from point 180 ft. west of Walton ave. to alley east of Walton ave. The contract price is 63½ cents.

Portland, Ind.—For construction of Fifer Ditch in Bearcreek Township, by Superintendent of Construction, to Portland Drain Tile Co., at $770. Drain is about three-fourths mile long.

Atchison, Kan.—By City Council, for construction of West Atchison sewer, to Williams & Sample, of Kansas City, Mo., for $22,561. Other bids received were: Kelley & Kelley, St. Joseph, $22,696; Olson-Schmitt, St. Joseph, $22,700; McGuire & Stanton, of Leavenworth, $23,137; F. W. Keller, Webb City, Mo., $23,253; Intermountain Construction Co., Tecumseh, Neb., $23,569; Thomas Beattie, Atchison, $24,438.

St. Louis, Mo.—To Robert Wycoff, 3642 McRee ave., St. Louis, Mo., by Board of Public Improvements of that city, for construction of sewers in Manchester Road Sewer District No. 4, embracing sewers of materials, lengths and sizes as follows: 212 ft. of 27-in. inside diameter pipe sewer, 210 ft. of 24-in. inside diameter pipe sewer, 447 ft. of 18-in. inside diameter pipe sewer; 1,620 ft. of 12-in. inside diameter pipe sewer. With sewer inlets, manholes and appurtenances. Contract price is $3,715.

Millburn, N. J.—To Michael Garafano, by Millburn Township Committee, Millburn, N. J., for construction of lateral sewers in Brantwood and Wyoming sections of Millburn. Work includes laying

of 6,310 lin. ft. of pipe, 22 flush tanks, and 9 manholes. Contract price is $5,824.

Canton, O.—By Board of Control, for construction of South Harrison ave. sanitary sewer, to Peter Christiansen, for $2,145. Other contracts were awarded as follows: Harrison ave., storm sewer, Downs Construction Co., $722; Shorb st., sanitary sewer, Press Campbell, $468; N. Cherry, Hiram and Lake sts., sanitary sewer, John Skeeles, $949.

Toledo, O.—To Thos. J. Kelly, for construction of local sewers 1126, 1127, 1128, 1129 and 1131, in Toledo, for $1,025, $1,540, $292, $1,498 and $1,704, respectively.

Greenville, Tex.—By Greenville City Council, to E. L. Dennis, to construct storm sewer on Polk st., price to be paid for same being $1,262.80.

Waco, Tex.—To H. B. Gass & Co., Independence, Kan., at $25,000, for constructing additional sanitary sewers, at Waco.

Seattle, Wash.—By Board of Public Works, for construction of sewers in N. 78th st., to Johnson & Co., 929 Blewitt st., Seattle, for $13,031. Other bidders on the work were: Ward & Scherer, 111 Pine st., $15,180; Will Kopta, 1422 27th ave., $16,206; R. J. Barter, 2832 Harvard ave., N., $15,746; J. Ruthe, 131 W. Kilbourne st., $15,405; Becker & Walker, $17,202; Krogh & Jessen, 1418 24th ave., $14,137; Dalstrom & Rodal, 2437 W. 56th st., $14,718; Young & Ulrich, 703 American Bank Bldg., $14,457; Erickson Bros., Pioneer Bldg., $15,646; Hayden & Sons, 4642 Easton ave., $13,552.

WATER SUPPLY

Modesto, Cal.—Bond issue of $8,500 for complete reconstruction of municipal water system will be submitted to voters of Modesto some time in February. City Council has been working for some time on plans and has arrived at decision in regard to needs of system. Plans virtually mean entire rebuilding of system, which has long been inadequate for needs of city. Changes and additions that are proposed include new mains to cost in neighborhood of $41,724; additional hydrants, $3,141; additions and changes in the pumping plants, including purchase of Cressey pump at old gas works; extensive improvements at 8th and 17th sts. and Wisecarver stations, $22,000; other improvements, including two tanks of a capacity of 100,000 gals. each, $11,900.

San Francisco, Cal.—Mission Bank and Mission Savings Bank have purchased $50,000 worth of Hetch-Hetchy water bonds.

Tulare, Cal.—Municipal water system is being considered to cost $150,000.

Oak Park, Col.—Oak Park Water Company has purchased lots where it intends to sink several wells.

Olathe, Col.—Waterworks system, to cost $65,000, will be installed.

Bristol, Conn.—Vote has been taken here on municipal ownership of waterworks, and of 992 voters who cast ballots, 705 were in favor of question and 287 opposed.

Hartford, Conn.—Construction of two dams, pipe line 8 miles long and other improvements to cost $3,000,000 are being considered by Board of Water Commissioners.

Madison, Fla.—Bond issue of $30,000 is being considered for purchasing water plant.

Macon, Ga.—C. C. Anderson, City Engineer, has prepared plans for stand pipe and other improvements, to cost $50,000.

Evanston, Ill.—Installation of filtration system is being considered.

Sullivan, Ind.—E. M. Kerlin, of Vincennes, has wired City Council that he has accepted proposition of furnishing city of Sullivan with water from gravel beds of Riverton. Estimated cost is $75,000. Franchise provides that work must be completed in one year.

Galesburg, Ill.—City Engineer F. M. Connelly is preparing preliminary plans for 2,041 ft. of 24-in., 4,560 ft. of 12-in., 1,824 ft. of 18-in., and 413 ft. of 15-in. vitrified pipe sanitary sewers in Henderson, North, Lawrence, Olive and Hawkinson sts., to cost $12,776.22. Also for 967 ft. of 24-in., 3,424 ft. of 18-in., and 1,902 ft. of 15-in. sanitary sewer in Main st., to cost $18,079.94.

Joliet, Ill.—The Board of Local Improvements rejected all bids for constructing the Nicholson water main, and the Clerk was instructed to readvertise for bids.

Tampico, Ill.—Waterworks system to cost $16,000 will be installed.

Owensville, Ind.—Installation of waterworks system is being considered.

Des Moines, Ia.—Water main, 20-in., will be laid from 15th st. to Grand ave.

Kinsley, Kan.—Bonds in sum of $12,500 will be issued for installation of waterworks system.

Newcastle, Ind.—Appropriation of $60,000 will be made for improvements to municipal water plant. These will include new mains, drilling of five wells and installing new pump and boiler.

South Bend, Ind.—Recommendation of Board of Public Works for $200,000 for improvements to water system have been approved by Council. These will consist in increasing pumping capacity, building storage reservoir and a stand pipe.

Foler, Kan.—Waterworks system to cost $20,000 is being considered.

Covington, Ky.—Water Commissioners have recommended laying of 30- and 10-inch mains.

Morgan City, La.—Bids will be received by Chairman of Finance Committee up to noon, Feb. 17, for purchase of $80,0 serial bonds of municipal corporation of Morgan City, La., for purpose of constructing waterworks system and sewerage system.

New Orleans, La.—Mains will be extended 1,000 ft. and hydrants installed to protect Delgardo Art Museum.

Saginaw, Mich.—Board of Public Works request for $10,000 pump has been approved.

Belleville, Mo.—The contract of the Belleville Water Supply Co. to supply Belleville with Mississippi River water has been filed with City Clerk, G. H. Beineke. F. M. Reilly is president of the water company.

St. Joseph, Mo.—Representatives of St. Joseph Water Co. will appear before Public Utilities Board and ask that company be authorized to issue bonds of $250,000 to cover proposed improvements.

York, Neb.—Petition with proper number of signatures was filed with City Clerk asking City Council to submit proposition to people of this city to vote bonds in sum of $125,000 for purpose of erecting municipal water, electric light and heating plant. Matter will be taken up by City Council at its next regular meeting.

Cornwall, N. Y.—Water bonds, $30,000, have been purchased by Watson & Pressfrich, 36 Nassau st., New York City.

Little Falls, N. Y.—It has been decided to purchase suction pump to draw water from hydrants in case of necessity.

Newburgh, N. Y.—Mayor Corwin has awarded $125,500 worth of water bonds, to James R. Magoffin, of New York City, whose bid for bonds was 103.50.

Wolcott, N. Y.—Installation of municipal waterworks system is being considered.

Yonkers, N. Y.—Laying of water mains on a number of streets has been approved.

Bryan, O.—Waterworks improvements are planned, to cost $46,000.

Dayton, O.—Waterworks improvements to cost $140,000 are under consideration.

Toledo, O.—Finance Committee of Council has approved bond issue of $150,000 to be used in making improvements at Broadway pumping station.

Central City, Pa.—Council has been petitioned to hold special election to vote on $10,000 bond issue for waterworks.

Meadville, Pa.—Ordinance has been passed for all water consumers to install meters.

Columbia, S. C.—W. F. Steiglitz has recommended construction of coagulating basin at filter plant. Also installation of 20 improved hydrants, and construction of 6-in. main in Price ave.

Hillsboro, Tex.—City has sold to John B. Oldham, of Dallas, $15,000 waterworks bonds.

Philadelphia, Pa.—The 21st Ward Board of Trade are urging City to replace wooden trestles supporting water pipe with iron structures.

Temple, Tex.—Board of Water Commissioners are discussing installation of meters.

La Crosse, Wis.—Plans for new waterworks system to cost $260,000 are under consideration.

Calgary, Alta, Can.—Filtration system and other improvements to cost $405,000 are recommended by City Engineer.

CONTRACTS AWARDED

Berryville, Ark.—By City for installation of complete waterworks system, to Will F. Plummer Co., of Springfield, Mo.

Montgomery, Ala.—By City Commission for furnishing city waterworks plant with new electrical air compressor to Hardie-Tynes Co., of Birmingham, at cost of $12,435, with synchronous motor, Crocker-Wheeler type, complete and installed.

Sacramento, Cal.—To A. E. Pearson, for constructing pump house; cost, $1,370; J. A. Yates and Nevada Engineering Works, for pumping plant, $2,300.

San Francisco, Cal.—For two additional filters in pumping station at Presidio, to C. F. Braun & Co., of San Francisco, as follows: For two wooden filters, $6,180; for Red Wing sand, $1,400, and for pipe outside of building, $8,770.

Macon, Ga.—Waterworks Commissioners, for $81,753, to U. S. Cast Iron Pipe & Foundry Co.

Summerville, Ga.—By Village Council to Dysard Construction Co., Atlanta, Ga., for construction of waterworks.

Collinsville, Ill.—To Thomas J. Morton, of Edwardsville, Ill., for sinking two 90-ft. 10-in. wells at Collinsville waterworks plant, Collinsville, Ill.

Waterville, Kan.—For waterworks and electric light systems, to Des Moines Bridge & Iron Co., of Des Moines, Ia., at $27,976.

Minneapolis, Minn.—For valves as follows: Roe-Stephens Mfg. Co., Detroit, 10 16-in., $60.50 each; J. B. Clow & Son, Chicago, one 30-in., $225; one 48-in., $495, and two 48-in., at $695 each.

St. Paul, Minn.—South Park Foundry & Machine Co. was low bidder on hydrants, bidding $39 for small and $47 for large type. They were also low on the special castings, at $55 per ton. Crane & Ordway Co. were low bidders on valve and service boxes. St. Paul Foundry Co. was low bidder on the construction of cast iron platform and stairs at the Centerville engine house, at $1,185. All the bids on pipe were laid over. United States Foundry & Cast Iron Co. bid $25.40 a ton on 24-, 30- and 36-in. pipe, while Camden Iron Works bid $27.80 a ton. American Cast Iron Pipe Foundry Co. and Lynchburg Foundry Co. were low bidders, each bidding $25.25. Board expects to purchase 5,500 tons of pipe.

St. Charles, Mo.—By City Council, for erecting two (twin) storage reservoirs, each 70-ft.—85-ft.—26-ft., to Bull & Uberle, at $20,144. Carr Edwards, City Engineer.

St. Charles, Mo.—By City to Bull & Herfel, for construction of two reinforced concrete reservoirs, 85 x 70 x 26. Also for furnishing and laying 5,000 lin. ft. of 12-in. and 631 ft. 6-in. cast iron pipe, together with necessary specials, valves, etc.

St. Charles, Mo.—By City Council, for furnishing and laying 5,155.60 lin. ft. of cast iron pipe and 631 lin. ft. of 6-in. pipe (cast iron) with valves, etc., to John Schulze, of St. Charles, Mo., for $8,803.60. Other bids were as follows: Bull & Uberle, reservoirs, $20,144; pipe line, $8,979.55; John Schulze, pipe line, $8,803.60; Midland Bridge Co., reservoirs, $29,949; Heirsh & Micotto, pipe line, $10,315.56; Harry F. Heman, pipe line, $8,892.05; Thos. Fox, reservoirs, $21,600; pipe line, $9,225; Slater & Fettig, reservoirs, $32,050; Murray Construction Co., pipe line, $9,550; Pelligreen Construction Co., reservoirs, $21,300; pipe line, $9,350. Carr Edwards, City Engineer.

Fallon, Nev.—By City to Western Engineering & Water Supply Co., Oakland, Cal., for construction of a system of waterworks for Fallon.

Rochester, N. Y.—To Hersey Co., for furnishing various sized detector meters for Waterworks Department, and Florence Iron Works was successful bidder on various sizes of valve boxes for Water Bureau.

Charlotte, N. C.—By Board of Water Works Commissioners, to J. W. Hass, city, at $19,972.40, for construction of waterworks pumping station at Catawva River, and concrete intake in middle of river.

Kingfisher, Okla.—By City, for installation of waterworks, to Benham Engineering Co., of Oklahoma City.

Porum, Okla.—By Town Council, for construction of complete waterworks system and electric light plant, to Kennedy & Fleming, of Oklahoma City, Okla., at $33,000.

Portland, Ore.—To Gould Co., of Portland, Ore., by Water Board of Portland, Ore., for furnishing of 200,000 lbs. of Selby pig lead, f. o. b. Portland. Contract for furnishing 20,000 lbs. of leadite was not awarded.

Dallas, Tex.—By Municipal Commissioners, to H. S. Hasie, Jr., for constructing concrete dam at Carrolton, at $23,875. The Board also adopted, upon Mr. Nelms' recommendation, the bid of Coldwell & Wilcox, of $445 each, or $890, for two 48-in. sluice gates for the Carrollton Dam. Other bidders were: Chapman Valve Co., $695 and $770 per valve, with stationary and rising stems, respectively; John W. Taylor, $500 per valve; Eddy Valve Co., $500 per valve.

Footville, Wis.—To Acly & Collins Co., of Harvard, Ill., for sinking of a 20-ft. well for Denmark Construction Co., at $1,200.

Prince Rupert, B. C., Can.—For furnishing of 1,800 tons of cast iron pipe for Lake Woodsworth water scheme, to Balmour, Guthrie & Co., for $63,111. Other bidders for the pipe were: Evans, Coleman & Evans, Ltd., $63,208; John Coates & Co., $64,911; Edward Le Bas Co., $66,-619; Robertson, Godson Co., $71,174; Beverley, Robertson & Co., $71,615; C. Handyside, $72,153; Hofius Steel & Equipment Co., $74,900; Canadian Foundry Co., $76,955; R. D. Wood & Co., $78,437.

BIDS RECEIVED

Wilmington, Del.—For new horizontal water turbine wheels and triplex pumps to be installed at pumping station. Only one bid was received for pumps. The Birdsboro Steel Fdry. & Machine Co., of Birdsboro, Pa., bid being $11,000 for the 4,000,-000-gal. triplex pump, and $6,550 for the 2,000,000-gal. pump. Low bid for turbines was submitted by Risdon Alcott Turbine Co., of Mt. Holly, N. J., its bid being $3,-300 for 80,000,000-gal. daily discharge wheel to be erected on foundations supplied by city, and $3,000 for the 40,000,000-gal. wheel. Other bids received for this work were Camden Water Wheel Works, Camden, N. J., $3,864 and $2,983, respectively; S. Morgan Smith Co., Holyoke, Mass., $4,500 and $3,700.

Lawrence, Mass.—Following bids for cast iron pipe have been received: Donaldson Iron Co., Emaus, Pa., 4- and 6-in. pipe, $22.75 per ft.; 8- and 6-in., $21.90. M. J. Drummond & Co., New York, 4-in. pipe, $25.36; 6-in. and 8-in., $23, and 16-in., $22.45. Charles Miller & Son's Co., $22.35 for all sizes. United States Cast Iron Pipe & Foundry Co., Philadelphia, $22.30 for all sizes. Warren Foundry & Machine Co., New York, $23 per ft. for all sizes. R. D. Wood & Co., Philadelphia, $22.45 for all sizes. Standard Cast Iron Pipe & Foundry Co., Bristol, Pa., $23.20 per ft.

Las Cruces, N. Mex.—For construction of water and sewerage systems for city. Fred Dieter, $65,000; F. R. Stone, $56,-437.55; Bash & Gray, $54,953; D. B. Gordon, $65,262; G. Jasger (American Light & Water Co.), $61,654; Mayfield Shaw Construction Co., $57,692; E. M. Eby, $61,654; J. C. Huff, $77,537; Peter O'Brien Construction Co., $67,142.75; M. F. Dicus, $63,427; W. F. Plummer Co., $56,387.85; W. Jennings & Woods, $73,304.82; Hamilton Bros. Construction Co., $60,127; W. E. Anderson, $60,463.61; Central Construction Co., $60,245.15; W. W. Cook & Son, $56,-921.75.

LIGHTING AND POWER

Nevada City, Cal.—Trustees will take up project of establishing a municipal lighting system. Pacific Gas & Electric Co. will be asked to name figure which it will accept for its plant.

Norwich, Conn.—Lighting Committee has been authorized to contract with Willimantic Gas & Electric Light Co. for lighting of city for five years.

Pomona, Cal.—Chief Engineer Lewis, of Southern California Edison Electric Co., is conferring with Park Superintendent Paige in regard to installing underground system of wiring Ganesha Park for electric lights.

Baltimore, Md.—Bids for conduit construction and furnishing iron castings have been rejected and will be readvertised.

Hagerstown, Md.—Town Board is considering installation of oil engine and reconstruction of an old gas engine. Failure of natural gas supply is the cause.

Muskegon, Mich.—Council of cty of Muskegon Heights has passed resolution accepting bid of Grand Rapids-Muskegon Power Co. for furnishing city, commercial and residential lighting for period of 10 years.

Sparta, Mich.—Special election will be held Feb. 5, when proposition of Grand Rapids & Muskegon Power Co. to furnish city with electric current will be voted upon by electors. Company desires franchise for 30 years, and if terms are acceptable to voters it is planned to furnish current to other towns in vicinity.

Virginia, Minn.—Valuation and appraisement of light and power plant is being made with view to purchase by city.

Kerkhoven, Minn.—Citizens have petitioned that electric light plant be erected.

Alton, Mo.—Members of Alton City Council, who have been investigating municipal lighting plant proposition have not been favorably impressed, and it is said by Council members they favor letting contract to some public service corporation.

Fargo, N. Dak.—At five o'clock 29th day of January, 1912, bids will be received at the office of City Auditor, for purchase of electric light plant bonds of city of Fargo, of par value of $10,000.

David City, Neb.—Fairbanks, Morse & Co. have asked for franchise to construct complete electric light and power plant.

Lincoln, Neb.—F. H. Grover, Chicago, Ill, who is reorganizing Nebraska City Gas Co., has requested Railway Commission to authorize issue of $80,000 in bonds and $120,000 in stock. Of this it is proposed to spend $19,000 in immediate improvements.

South Omaha, Neb.—City Engineer will prepare for petitions for creating lighting district.

Edwards, N. Y.—As counter proposition in proposed installation of pumping station, equipped with gasoline power to supply village with water, another plan has been advanced, to have Edwards Electric Light Co. furnish electric power. This plant has been in operation for two years and has given good service.

Valatie, N. Y.—Village Trustees will soon take up matter of owning lighting plant.

Dayton, O.—Bonds to amount of $129,-800 have been sold at office of City Auditor, George W. Bish, of which general lighting bonds, in sum of $30,000, 4 per cent., were sold to Western German National Bank of Cincinnati, at premium of $168.33.

Meyersdale, Pa.—With object of learning whether Meyersdale is paying too much for its electric light, Council is advertising for bids on furnishing light to city. The Meyersdale Electric Light, Heat & Power Co. has applied for renewal of its franchise, which expired Dec. 26, but Council has extended time for bids until Feb. 26 and will grant no franchises until after that date.

Pittsburgh, Pa.—Conference between committee of business men and committee of Council agree to ask for $10,000 for cluster lights for Federal st.

Pittsburgh, Pa.—Director Armstrong is working on plans for completion of Northside pumping station and construction of new Northside reservoir, latter to be built at cost of over $1,000,000 from the 1910 bond issue. Sum of $200,000 will be asked for to make alterations in 10 new filter beds.

York, Pa.—Petition with proper number of signatures has been filed by City Clerk asking City Council to submit proposition to people to vote bonds in sum of $125,000 for purpose of erecting municipal electric light and heating plant and water plant.

Providence, R. I.—Narragansett Electric Lighting Co. has submitted to City Council's Special Committee on Lighting Franchises, proposition for new contract for lighting city streets, which will mean annual saving of about 40,000 over present cost. Company proposed to charge city $85 per arc light year for those on underground system, and $75 per annum for those of aerial system. Present rate is $100 flat.

Provo, Utah—After using lighting system, which has been insufficient for needs of Provo for a number of years, General Electric Co., of this city, has decided to install system which will be second to none in State.

Salem, Utah—City has decided by a vote of 60 to 5 at a special election to bond the town for $6,000 in order to secure electric lights. Andrew Peterson, President of Town Board, states that Salem will not need to install plant for lighting, but will secure its power from branch line from power plant at mouth of Spanish Fory Canyon.

Niagara Falls, Ont.—Electric Light Committee at meeting at the electric light station, acted upon question of better illumination system for city. Plans for both arc lights and cluster lights, latter for decorative purposes, were discussed, as submitted by Superintendent Foster. Board decided to have arc lights installed as soon as possible to replace present incandescent lights and matter of cost of permanent system will be gone into at once.

BIDS RECEIVED

Boston, Mass.—Rising Sun St. Lighting Co. has offered to continue street lighting at present cost of $22.30 per light per year. It will sell lights outright for $9.50 a lamp. The Auto Lighting Co. put in two bids, one at $12, the other at $6 per lamp. Novelty Mfg. Co. offered to supply inverted lamp for $5.95 or $4.95. Ehrich and Gratz, Berlin, submitted one bid for $6.23, and another for $5.20. United Gaslight Manufacturing Co. bid $5 and $4.40. Lundin Electric & Machine Co. bid $6. Pressure Lighting Co., New York, $14.50.

FIRE EQUIPMENT

Fort Smith, Ark.—Replacing of present apparatus with motor-propelled equipment is recommended.

Los Angeles, Cal.—City will erect new fire engine house at cost of $64,000.

Los Angeles, Cal.—Purchase of motor-driven pumping engine and hose wagon for Engine Co. No. 12 will be authorized by City Council.

San Francisco, Cal.—Board of Fire Commissioners have asked Supervisors for bond issue of $500,000 to rehabilitate the Fire Department.

San Leandro, Cal.—That residents of San Leandro are heartily in favor of proposed $50,000 bond issue for installation of modern fire alarm system, repairing old City Hill, and mending several of main streets was announcement made by city officials after taking straw vote in voting districts.

Visalia, Cal.—Purchase of auto fire engine is being considered by City Trustees.

New Britain, Conn.—Resolution favoring construction of $20,000 fire station is pending.

Putnam, Conn.—Fire Department is considering purchase of additional hose.

Atlanta, Ga.—Purchase of motor apparatus and four new fire stations are being considered.

Dalton, Ga.—People of North Dalton have petitioned City Council to establish station of Fire Department in that section of city, giving them better protection and enlarging fire fighting force. Petition has been referred to Fire Committee.

Macon, Ga.—Combination motor truck may be purchased.

Havana, Ill.—Election will be held for voting on question of purchasing auto fire truck.

Peoria, Ill.—Committee on Fire Department has recommended that Finance Committee appropriate $14,375 for purchase from Robinson Fire Apparatus Mfg. Co., of St. Louis, Mo., of Jumbo type of fire engine, and also hose, ladder and chemical wagon.

Rock Island, Ill.—Auto apparatus will probably be purchased.

Westfield, Ill.—Local fire department will purchase 1,000 ft. of hose.

Fort Wayne, Ind.—Board of Public Safety has decided to ask Council for permission to sell four horses from Fire Department to make room for new auto chemical engine. Machine is being made by Harter Fire Appliance Co., of Chicago, in accord with specifications given by Board. Board of Safety will soon ask for bids on installation of 10 new fire alarm boxes.

Indianapolis, Ind.—Fire headquarters will have new automobile combination hose and chemical wagon, new automobile ladder truck, automobile squad wagon already in service at house and Fire Chief Coots. This will be first engine house in city to be equipped throughout with motor apparatus. New engine house will be completed later in month in 38th st., near Ruckle st. and this will be equipped with new automobile combination pump and engine with 1,000 ft. of hose.

Indianapolis, Ind.—Fire Chief Coots is preparing tentative floor plans for new fire headquarters' building it is proposed to erect at southeast corner of Alabama and New York sts. The chief's tentative plan calls for two-story building to cost $40,000.

Michigan City, Ind.—Chief Charles Schlundt has recommended the purchase of 1,000 ft. of hose and purchase of auto chemical and hose.

Alton, Iowa—Mathew Faber, Remsen, Iowa, was granted franchise by Council, subject to an election, to install electric light plant.

Des Moines, Iowa—National Board of Fire Underwriters have recommended purchase of following equipment: Installation of combination motor-driven hose wagon and chemical engines at central fire station and Station No. 2, each to be manned with seven men; automobile for assistant fire chief; provide first sized steam engine, equipped with three men, at Station No. 13, 8th and Mulberry sts.; provide hydrant valves for each hose wagon; provide ladders for hose wagons in districts not covered by ladder trucks; duplicate supply of hose at each fire station; provide extra shut off and four-way turret nozzles; provide recording water pressure guage at central station.

Des Moines, Iowa—The fire fund for

the coming fiscal year will be $145,000. Councilman John MacVicar, of the Public Safety Department, may be able to purchase two motor squad wagons for Fire Department.

Mitchellville, Iowa—Geo. T. Gibson was granted franchise to build and maintain electric light and power plant.

Muscatine, Ia.—Alert Hose Co. is considering purchase of auto or horse-drawn chemical engine.

Ottawa, Kan.—Purchase of modern fire apparatus is being discussed.

Govans, Md.—Question of purchasing auto fire engine and other equipment will be decided by Committee.

Arlington, Mass.—Town has been asked to appoint committee to investigate advisability of erecting building on Park ave., Arlington Heights, for fire and other purposes and of installing therein auto hose and chemical truck. Committee is to make report at annual meeting in March. Another committee will be appointed to consider advisability of purchasing and installing auto fire pump at Broadway fire station.

Boston, Mass.—Horse-drawn fire apparatus will be displaced by motor apparatus in Greater Boston within five years, according to annual report of Henry A. Spencer, Chief of Chelsea Fire Department. He recommends that Chelsea purchase automobile combination chemical and ladder truck, install it in house of Engine 4 in Prattville district, and place that engine in reserve.

Boston, Mass.—Purchase of combination motor wagon for Manet rd. station has been authorized.

Lynn, Mass.—Public Property Commissioner Bayrd has estimated cost of fire station on Hollingsworth st. at $12,000.

Easthampton, Mass.—Installation of fire alarm system is under consideration.

Gloucester, Mass.—Purchase of 1,500 ft. of 2½-in. hose is authorized.

Haverhill, Mass.—City is considering installation of fire alarm system.

Newton, Mass.—Purchase of auto chemical and hose wagon is under consideration.

Bay City, Mich.—Two sets of plans for proposed fire department headquarters at McKinley and Adams sts. have been submitted to Fire Department Committee, one by Pratt & Koeppe and other by Clark & Munger, architects. The Pratt plans provide for a building that will cost from $20,000 to $25,000, and the Clark plans provide for expenditure of $20,000 to $21,000, both according to the material used.

Little Falls, Minn.—City Clerk will shortly ask for bids for furnishing 3,000 ft. of fire hose.

St. Joseph, Mo.—Board of Pub Works is considering site for erection of fire station.

Blair, Neb.—Erection of combined fire house and city hall is being considered.

Portsmouth, N. H.—In his annual report Chief Engineer John D. Randall recommends purchase of auto combination hose wagon and chemical on ground of economy and efficiency, building of modern fire house, general overhauling of Engine 3, various repairs to other apparatus, improvements of fire houses and purchase of new and reliable hose.

Portsmouth, N. H.—Purchase of 1,000 ft. of new hose is authorized.

Atlantic Highlands, N. J.—Hose Co. No. 1, of this city, has decided to buy automobile truck.

Delaware, N. J.—Purchase of chemical engine and additional hose are being discussed.

Garfield, N. J.—New hose will probably be purchased.

Jersey City, N. J.—Chief Conway recommends organization of three new engine companies; fire alarm system costing about $75,000; auto runabout for batallion and assistant chiefs, and establishment of fire patrol by insurance companies.

Orange, N. J.—Purchase of auto fire apparatus is being considered.

West Hoboken, N. J.—Council is considering purchase of auto hose wagon and additional hose.

Amsterdam, N. Y.—City is considering purchase of motor fire truck, to cost about $5,000.

Dolgeville, N. Y.—It is said that $1,500 has been voted for installation of air fire alarm whistle.

Center Moriches, N. Y.—Purchase of new chemical engine is being considered.

New York, N. Y.—Park Commissioner Stover will support Fire Commissioner Johnson's request for permission to build fire alarm central station in Central Park near 65th st. transverse road, at cost of $80,000.

Oneida, N. Y.—Improvements to fire alarm system are under consideration.

Port Jervis, N. Y.—Sum of $1,000 has been provided for purchase of new hose.

Rochester, N. Y.—Fire Chief Little, in his annual report, recommends erection of three new fire houses, purchase of new fire engine, and purchase of 5,000 ft. of new hose.

Syracuse, N. Y.—Alderman Andrew Goettel, Jr., wants city to sprinkle streets instead of contracting for work.

Utica, N. Y.—Commissioner Church has strongly recommended purchase of automobile combination chief's rig and chemical for Central Fire Station.

Watervliet, N. Y.—Mayor Hanratta has announced that proposition of purchasing needed apparatus for fire department would be put up to taxpayers at special election to be held in a few weeks.

Cincinnati, O.—Petitions have been received for purchase of auto fire apparatus.

Columbus, O.—Another effort is being made to get fire engine house on Hilltop at Broad st. and Wheatland ave. Ordinance providing for $40,000 bond issue to cover cost has been introduced.

Conneaut, O.—Improvements to fire department are being discussed.

Coshocton, O.—City will purchase motor fire apparatus.

Lakewood, O.—Bonds in sum of $15,000 have been voted for additional fire equipment.

Middletown, O.—Better fire protection is being urged by taxpayers.

Springfield, Ore.—New fire equipment will probably be purchased.

Philadelphia, Pa.—Ordinance appropriating $30,000 for fire house on Germantown ave. is pending.

Pittsburgh, Pa.—Committee of West View Borough Council has met with members of Fire Department and discussed question of erecting new fire house. George McIntosh and Lawrence Moore have been appointed committee to have plans and specifications prepared.

Oil City, Pa.—Appropriation has been made for fire house in 9th Ward. Fire Committees report include allowance of $800 for new fire boxes.

Scranton, Pa.—Petition has been received asking for new fire station at Tripp Park; estimated cost $41,000.

West Middlesex, Pa.—Fire Department has decided to recommend to Borough purchase of new fire hose and repairing fire alarm system, including new bell.

Charleston, S. C.—Tractor to be attached to steamer will probably be purchased.

San Angelo, Tex.—City has signed contract for purchase of new auto fire wagon, combination hose and chemical. Machine, which costs $9,500 and is of type being used by Wichita Falls, Big Springs and other cities in State, is to be delivered within 60 days.

Lyndonville, Vt.—Purchase of auto truck and chemical engine, to cost about $7,500, has been authorized by City Council.

Brandon, Man., Can.—Additional fire apparatus will likely be purchased.

Aguascalientes, Mex.—Aguascalientes will establish a fire department with branch sections in all directions, provided with hand and steam pumps, and ladders, hooks, etc.

CONTRACTS AWARDED

Hot Springs, Ark.—To Voorhees Rubber Mfg. Co., 2,000 ft. "Overall" brand 2½-in. hose.

San Francisco, Cal.—By Fire Commissioner, chief's auto, to Pierce-Arrow Co., for $5,962.

Unadillo, Ga.—For constructing 1½ miles of water mains, to Walton & Wagner, of Atlanta, at $22,800.

Lynn, Mass.—To American-La France Co., for 2,000 ft. of double-jacketed fire hose, the price being 70 cents per ft. There were seven bidders and contract was given to lowest bidder.

Niagara Falls, N. Y.—By Fire Commissioners for six new fire alarm boxes, to Star Electric Co., at $525.

Niagara Falls, N. Y.—By City for 400 ft. of fire hose, to Adams Hardware Co., at 80 cents per ft., and 400 ft. to Elderfield-Hartshorn Co., at 90 cents per ft.

Norwalk, O.—By city officials to purchase $8,500 auto fire engine from American-La France Fire Engine Co., of Elmira, N. Y.

Webber's Falls, Okla.—To Voorhees Rubber Mfg. Co., 1,000 ft. 2½-in. hose.

San Angelo, Tex.—To G. W. Smithson, by City Administration, for a 120 horsepower combination pumping engine, chemical and hose wagon, which is largest fire engine that has thus far been purchased in Texas.

Everett, Wash.—For furnishing auto combination chemical and hose wagon, to America-La France Fire Engine Co., of Elmira, N. Y., at their bid of $6,100.

BIDS RECEIVED

San Francisco, Cal.—By Board of Fire Commissioners for furnishing fire apparatus: For automobile truck, to be used to transport supplies from corporation yard to various engine houses, American-La France, $5,630; Reliance Automobile Co., $4,100; Consolidated Motor Car Co., $3,630, and the White Co., $3,500. For five-passenger car for Fire Chief bids were received from Pierce-Arrow, $5,962.80; Standard Motor Car Co., $5,780; Reliance, $5,750; White, $5,310; Thomas Flyer, $5,250; Consolidated Motor Car Co., $4,200. Latter bid is for a four-cylinder car. For cars for assistant chiefs, four-passenger cars, bids were: Standard, $5,790; White, $5,310; Thomas Flyer, $5,250; Pierce Arrow, $5,114.35; Consolidated, $4,950; Reliance, $4,150, and Thomas B. Jeffery, $3,900. Commission awarded contract for Pope Hartford touring car for use of second assistant fire chief at $4,950. Awards for automobile hook and ladder truck and delivery truck were held awaiting opinion from City Attorney Long as to whether Commission is obliged to accept lowest offer or may take other facts into consideration. Hook and ladder truck has been offered by Gorham Engine & Fire Apparatus Co. for $9,475, and by Webb Motor Fire Apparatus Co. for $10,250.

Pueblo, Col.—For automobile fire engine as follows: Waterous Engine Co., St. Paul, by Jules Pearce and William Tyler, six-cylinder car, 101 horse-power, pumping capacity, 600 gal. per minute, $8,200, f. o. b. Pueblo. American-La France Fire Engine Co., by H. L. Thomas and the Ideal Motor Car Co., four-cylinder car, 72 horsepower, 500-gal. capacity, $7,590. American-La France Bid No. 2, six-cylinder, 96 horse-power, capacity 700 gals. per minute, $8,590. Robinson Fire Apparatus Co., St. Louis, 70 horse-power, capacity 500 gals., $7,600. Bid No. 2, 80 horsepower, capacity 600 gals., $8,100. Bid No. 3, six-cylinder, 120 horse-power, capacity 700 gals. per minute, $8,600. Webb Motor Car Co., St. Louis, 700-gal. capacity machine for $8,500. Victor Motor Car Co., Buffalo, 80 horse-power, 550-gal. capacity, $6,000. Bids for the auto patrol were then opened. They were as follows: Ideal Motor Car Co., Stoddard-Dayton, 48 horse-power, $2,998. Agreed to take old patrol in at $600. Royal Garage Co., White car, $3,250, and take old car in at $500. Will Tyler, Kissel, Kan., 48 horsepower, six-cylinders, $3,500. Bid No. 2, same car with but four cylinders at $3,000. Pueblo Auto Co., Cadillac, 30 horsepower, $2,800. Victor Co., Victor machine, 55 horse-power, $3,700. The following are the bids submitted on the motorcycle: Auto Cycle Sales Co., Excelsior motor, 4 horse-power, $210. Hermann Repair Co., Indian, 4 horse-power, $180. Bid No. 2, Indian Twin, 7 horse-power, $225. Meade Auto Cycle Co., Excelsior, 4 horse-power, $210. Bid No. 2, Excelsior Twin, 7 horsepower, $265. Harley Davidson, $235.

Jacksonville, Fla.—For furnishing one aerial truck, one combination chemical and hose wagon and one hose wagon as follows: American-La France Fire Engine Co., Elmira, N. Y.: Aerial truck, $11,500; chemical combination, $5,500; hose wagon, $5,100. Seagrave Co., Columbus, O.: Truck (4-cylinder), $10,300, (6-cylinder) truck, $14,000; hose wagon (4-cylinder), $4,800, (6-cylinder), $5,000; chemical combination (4-cylinder), $5,150, (6-cylinder), $5,400. Robinson Fire Apparatus Co., St. Louis, Mo.: Hose wagon, $4,650, $5,150; chemical combination, $5,000, $5,500. United States Fire Apparatus Co., Atlanta, Ga.: Chemical combination, $5,000; hose wagon, $4,500. Peter Pirsch & Co., Kenosha, Wis.: Hose wagon, $4,000; chemical combination, $4,500. Knox Automobile Co., Springfield, Mass.: Hose wagon, $5,300, Model "R," $4,700; chemical combination, $5,825, Model "R," $5,100. Webb Motor Fire Apparatus Co., St. Louis, Mo.: Aerial truck (6-cylinder), $12,500, (4-cylinder), $12,250; chemical, $5,250; hose wagon, $4,250. Garford Co., Elyria, O.: Chemical, $4,800; hose wagon, $4,350. Julian Howard, Jacksonville (Packard): Chemical combination (30 h.-p.),$3,000, (40 h.-p.), $3,500. Fire Chief's Car.—Following bids on new car for Chief Haney as follows: Julian Howard (White gasoline), $3,975; Miller Automobile Co. (Premier), $3,750; Rambler Automobile Co. (Rambler), $2,800; Mitchell Motor Car Co. (Stoddard-Dayton), $2,500; Fred E. Gilbert Co. (National), $2,950; Fred E. Gilbert Co. (Glide), $2,250; Jacksonville Regal Motor Co. (American), $4,250; Eugene Hankins (Speedwell), $2,500.

Elizabeth, N. J.—For automobile apparatus as follows: The Nott Engine Co. submitted price of $8,500 on 4-cylinder combination hose, chemical and pumping engine, in addition to their bid of $9,500 for 6-cylinder machine, while Robinson Co. offered their "Jumbo" engine at $9,000 and one of lesser capacity at $8,500. Seagraves Combination Ladder Co. submitted two bids on automobile truck, one of $1,200, for four-wheel drive gasoline driven, and bid of $9,900 on six-wheel truck, tractor type. Chemical tanks on either truck with hose reel to cost an additional $350. Bids received on different types are as follows: Seagrave Co., truck, $12,000. American-La France Co., triple engine, $9,000; combination engine, $8,500; truck, $9,541.60. Webb Co., triple engine, $8,800; combination engine, $8,500; truck, $10,000. Nott Co., triple engine, $9,500; combination engine, $9,000. Knox Co., triple engine, $8,550; combination engine, $8,075. Robinson Co., triple engine, $9,000; combination engine, $8,650. Ahrens-Fox Co., combination engine, $9,000.

Memphis, Tenn.—For bids on 4,000 ft. of cotton-lined hose and 1,000 ft. of rubber-lined hose, estimated cost being $5,000. Six or eight bids were submitted, including following firms: Reichman-Crosby Co., the B. F. Goodrich Co., Day Rubber Co., Manhattan Rubber Manufacturing Co., Towner & Co., the Eureka Fire Hose Co., and the Livermore Iron Co. Bids averaged about 80 cents a foot for cotton-lined hose, and $1.30 a foot for rubber-lined material.

BRIDGES

San Francisco, Cal.—Harbor Board has referred question of constructing viaduct across Embarcadero to the Engineering Department for a report.

Grand Junction, Col.—By Board of Commissioners of Mesa County, to Patterson-Burghardt Bridge Co., Denver, at $67,215, for construction of Main st. bridge, at Grand Junction.

Trinidad, Col.—By Board of Commissioners of Las Animas County, to Charles Emerick, for construction of 50-ft. span across Canyon Delagna on main Aguilar rd., 12 to 14 miles north of Trinidad.

Washington, D. C.—Notwithstanding recent expenditure by District of $20,000 in strengthening Calvert St. Bridge, over Rock Creek, District Commissioners have asked Congress for appropriation of $6,000 with which to strengethen it further.

Jacksonville, Fla.—For constructing draw span bridge over McGirt's Creek on Ortego rd. as follows: S. A. Turknett, wood approaches to bridge, $3,900, and Converse Bridge Co., of Chattanooga, Tenn. for draw, $5,724.

Bliss, Idaho—For constructing riveted steel highway bridge over Snake River near Bliss, to Charles G. Sheely, Denver, Col., at $7,995. Other bids were: Minneapolis Steel & Machinery Co., $8,334; J. J. Burke & Co., Salt Lake City, Utah, $8,700; Northwestern Bridge Co., Green River, Wyo., $8,702; Missouri Valley Bridge & Iron Co., Leavenworth, Kan., $10,000.

Waukegan, Ill.—Board of local Improvements has passed ordinance for construction of concrete retaining wall on S. Genesee st., from Water st. to north end of proposed viaduct, over ravine on S. Genesee st., at cost of $608.97. Ordinance was read at Council meeting providing for $74,000 concrete viaduct on S. Genesee st.

Creston, Ia.—For bridge work for year 1912, to Standard Bridge Co., of Omaha, Neb., as follows: Pile bridge and approach superstructures, per lin. ft., $2.95; steel girders, 20 to 28 ft. superstructures, per lin. ft., $5.40; steel girders, 30 to 40 ft. superstructures, per lin. ft., $6.60; spans, 35 ft. superstructures, per lin. ft., $6.65; spans, 40 to 50 ft. superstructures, per lin. ft., $8.35; spans, 55 to 65 ft. superstructures, per lin. ft., $9.15; spans, 70 to 80 ft. superstructures, per lin. ft., $10.30; spans, 80 to 100 ft. superstructures per lin. ft., $11; spans, 105 to 120 ft. superstructures, per lin. ft., $13.50; end plank, each per ft. of bridge, 10 cents; steel joist for spans and approaches, extra per ft. of bridge, $2.60; extra girder arrangement, extra per ft. of bridge, $2.75; steel I. rail on spans and girders, extra per ft. of rail, 70 cents, steel lattice rail on spans and girders, extra per ft. of rail, $1; tubes, one tube only, per lin. ft., 24-in., $5; tubes, one tube only, per lin. ft., 30-in., $6; tubes, one tube only, per lin. ft., 36-in., $7.30; tubes, one tube only, per lin. ft., 42-in., $7.50; tubes, one tube only, per lin. ft., 48-in., $7.65; steel piling and caps, plan "A," per lin. ft., $1.10; steel piling and caps, plan "B," per lin. ft., $2; steel piling and caps, plan "C," per lin. ft., $2.85; red cedar piling, per ft., driven, 46 cents; red cedar piling, per ft., f. o. b. any station in Union County, 18 cents; steel caps for wood bridges, each cap, $10.50; fir lumber in place, per M., commercial cut, $35; fir lumber, f. o. b. any point in Union County, per M., commercial cut, $24.75; total, $16,730.

New Orleans, La.—Councilman Hartson has prepared ordinance directing City Engineer to prepare plans and specifications for erection of bridge over People's Ave. Canal at Gentilly rd. Appropriation for structure is $4,000. Comptroller Kennedy will advertise for bids as soon as plans are prepared and adopted by Council.

Salem, Mass.—Board of Commissioners of Essex County has completed plans for concrete and steel pier bridge, to cost $400,000. Board has petitioned Legislature for authority to appropriate and spend money for its construction.

West Duluth, Minn.—City Engineering Department is making estimate for replacing of 40th ave. bridge at Oneota st. with culvert and fill early in spring.

St. Joseph, Mo.—I. G. Hedrick, of firm of Hedrick & Cochrane, Kansas City, consulting engineers, is in St. Joseph working on plans for proposed viaduct at Union Station. Council has authorized Board of Public Works to employ engineers at cost not to exceed $1,000.

Virginia City, Mont.—By Commissioners of Madison County, for construction of bridge across Ruby River about 3 miles from Twin Bridges, replacing the Closton Bridge, to William Wilcox, Sheridan, Mont., at $1,550.

Lincoln, Neb.—By Sanitary District No. 1, Lancaster County, Brownell Block, for construction of four bridges over new drainage ditch, to Nebraska Construction Co., 12th and Ohio st., Lincoln Neb., at $1,800.

York, Neb.—To Western Bridge & Construction Co., Omaha, Neb., for construction of all steel and wooden bridges that may be built in York County, Nebraska, during year of 1912.

Goldsboro, N. C.—To Owego Bridge Co., Owego, N. Y., and Greensboro, N. C., at $1,328, for furnishing and erecting steel work for 80-ft. span steel bridge over Little River, near State Hospital, Goldsboro.

Elizabeth, N. J.—Committee of Freeholders will examine bridge on Maple ave. with view to extending it. Construction of culverts is under consideration.

Canajoharie, N. Y.—State Department of Public Works has submitted plans and specifications for repairs they deem necessary to bridge across Mohawk River connecting Canajoharie and Palatine Bridge.

Miamisburg, O.—By City, for new bridge over canal at Smith st., to Contractor Fox, and work will begin early in spring, as early as weather permits. Bridge will be same as Lindon Ave. Bridge.

Toledo, O.—Ordinance has been passed to provide for issuing of bonds of city of Toledo in sum of $135,000, for purpose of constructing old Cherry st. bridge across Maumee River at point extending from Ash st. on west side of Consaul st.

Youngstown, O.—Erection of new bridge, to cost $300,000, over East Federal st., is being discussed.

Youngstown, O.—City Engineer Frank Lillie has completed plans for two new concrete bridges for Lincoln Park, to cost about $4,000. He will send drawings to Park Board for inspection of Commissioners.

Guthrie, Okla.—It is expected that work of constructing viaduct over Santa Fe tracks and Cottonwood River will start shortly; estimated cost, $47,000.

Roseburg, Ore.—By County Court of Douglas County, for Brown's Ferry, Umpqua and Winston bridges, to Portland Bridge Co., Worcester Bldg., Portland, at cost of $42,000, plus approaches, which probably will total about $1,000. Contract of retimbering and otherwise improving Winchester Bridge was awarded to Columbia Bridge Co., Portland, at cost of $8,400.

Altoona, Pa.—Plans are being prepared for new bridge across railroad yard at 7th st.

Brady, Tex.—McCulloch County Commissioners' Court has contracted for low water bridge across Brady Creek on San Saba rd., at cost of $2,200. Bridge is to be concrete structure with total length of 162 ft., and is to be completed by April 8.

Salt Lake City, Utah—By Board of Public Works, for construction of new Ninth South st. bridge over Jordan River, to A. A. Clark, at $6,981. Next low bid was that of Joseph Burke & Co., at $7,665.

Richmond, Va.—At meeting of Committee on Streets appropriation of $2,400 additional cost for new Mayo Bridge was recommended to Council.

Spokane, Wash.—Board of County Commissioners has authorized reception of bids for $60,000 worth of steel and concrete bridges, to be built next summer. Four crossings are to be improved, according to recommendations of Commissioner Allen Scott. Bridge No. 126, which stretches 473 ft. across Eone Creek, is now wooden trestle, but is to be replaced by steel and concrete. Plans are also on file with County Engineer C. L. Graves for new bridge at Seven Mile, on Spokane, which is known as No. 164, and for new crossing on Latah Creek near Waverly, at bridges Nos. 15 and 18.

Tacoma, Wash.—Commissioner of Public Works will be petitioned for bridge at East Gulch.

Charleston, W. Va.—For construction of County bridge over Poca bridge near mouth of Kelly Creek, to Owego Bridge Co., Owego, N. Y., to be completed by May 5.

Winnipeg, Man., Can.—To Manitoba Bridge & Iron Co., Winnipeg, for 114-ft. span single leaf, highway bridge over Assiniboine River, at Osborne St., Winnipeg.

CONTRACTS AWARDED

Lake Village, Ark.—By Chicot County Court, for construction of steel and concrete bridge over Bayou Macon, on Eudora Grand Lake rd., to Vincennes Bridge Co., Vincennes, Ind., at $4,192. Structure will be 208 ft. long, consisting of 100-ft. and two 54-ft spans.

Merced, Cal.—For construction of trestle over Dry Creek, by Board of County Supervisors, to W. H. McElroy, Merced, Cal., at $1,097.

Merced, Cal.—By Board of County Supervisors, for construction of bridge over South Slough, including wooden and concrete work, to William Radike, San Jose, Cal., at $795.

Grand Junction, Col.—By Board of Mesa County Commissioners, Grand Junction, Col., for construction of bridge across Grand River at foot of Main st., to Patterson Bridge Co., Denver, Col., at $67,215.

Atlanta, Ga.—By Bridge Committee, to Griffin Construction Co., at $49,000, for construction of a steel bridge, with reinforced concrete approaches, at Bellwood ave.

Franklin, Ill.—By Commissioners of Road District No. 9 of Morgan County, to Charles von Wormer, Springfield, Ill., for construction of two concrete culverts and construction of about 8,800 cu. yds. of earth work.

Bedford, Ind.—By Lawrence County Commissioners, for steel reflooring of Davis Ferry Bridge over White River, to Vincennes Bridge Co., Vincennes, Ind., at $3,400.

Chariton, Ia.—By Lucas County Board, for construction of county bridge work, to Cyrus Bell, Whitebreast Township, at $1.90 per lin. ft.

St. Joseph, Mich.—By City Council, to Elkhart Bridge & Iron Co., Elkhart, Ind., at $3,430, for construction of a viaduct on Park st.

Beachhaven, N. J.—By Long Beach Turnpike Co., to General Contracting & Engineering Co., New York City, for construction of roadway and bridge across Barnegat Bay, New Jersey; cost about $75,000.

Tiffin, O.—By Commissioners of Seneca County, to Sykopp & McGormley Iron Works, Toledo, O., for construction of Baker Bridge.

Nowata, Okla.—By Commissioners of Nowata County, to Nelson Bros., city, and Muskogee, Okla., for construction of reinforced concrete bridge over Kentucky Creek, north of Armstrong's store.

Olympia, Wash.—State Highway Commission have awarded contract to D. M. Stevenson, Portland, for building bridge over Skagit River, at $29,494.

BIDS RECEIVED

Seattle, Wash.—For constructing concrete viaduct on Fremont ave., as follows: Lance & Peters, $53,935.30; Sparger Concrete Co., $59,327.60; Chamberlain Construction Co., $49,720.78; Graff Construction Co., $48,587.10; Kieburtz Smith & R., $59,044.65; Pearson Construction Co., $47,631.10; Sloane Bros., $46,335.65; Stillwell Bros., $56,941.10; Jahn Construction Co., $47,569.40; Stanley Bros., $59,160.30; Butler Construction Co., $52,680.50; F. S. Misho, $46,733.33; McRae Bros., $58,230.42; T. Ryan, $46,323.92.

MISCELLANEOUS

Anniston, Ala. — Improvements have been planned for Anniston Park.

Chico, Cal.—City Engineer Martin Polk and Street Superintendent Charles H. Hintz are working on plans for fireproo municipal barn and storehouse for equipment owned by city.

Long Beach, Cal.—Council is considering plans for Pine ave. and Devil's Gate piers.

Los Angeles, Cal.—North American Dredging Co., of Nevada, and Cleveland Concrete Pile Co. have offered to take bonds in payment for proposed piers and harbor work.

Los Angeles, Cal.—Extension of proposed municipal boulevard from the turning basin at Wilmington to Palos Verdes st. in San Pedro is recommended by Harbor Commission. Commission has asked Board of Public Works to revise harbor plans to include this extension.

Pacific Grove, Cal.—H. L. Broxall has presented plan for incinerator to care for refuse of towns situated on Monterey Peninsula.

Pasadena, Cal.—City is contemplating incurring bonded indebtedness of about $40,000 for construction of garbage destruction works.

Redding, Cal.—Shasta County Board of Supervisors in present session has passed resolution that counties of State should erect magnificent California Building in Golden Gate Park to house exhibits of entire State during exposition and to be used thereafter as permanet exhibition of State's products.

Sacramento, Cal.—Citizens and business men of Sacramento are planning for expenditure of fund of $250,000 bequeathed to city by William Land for establishment of park to be named in his memory. City recently purchased about 800 acres outside city for park purposes, and plans have been completed by noted landscape engineer for its improvement.

San Francisco, Cal.—Aquatic Improvement Association has asked Supervisors to issue $750,000 bonds for aquatic park. F. G. Phillips is president of the association.

San Francisco, Cal.—Supervisors have decided to erect new city hall building on old site and make it central edifice of civic center group. On March 28 bond issue election will be held, asking authorization of $8,500,000, of which $3,700,000 will be spent on proposed city hall.

San Mateo, Cal.—Extensive plans are being considered for improvement of parks.

Fort Pierce, Fla.—Sum of $80,000 public utility bonds are being advertised for sale.

Atlanta, Ga.—President J. O. Cochran, of the Park Board, favors plan to raise $25,000 for purchase of animals for Grant Park Zoo.

Augusta, Ga.—Canal Committee will ask for $3,000 to dredge river above city locks.

Springfield, Ill.—Plans for municipal building, made by Architect Conway, provide for four-story building, with convention hall, fire and police departments.

Kendallville, Ind.—Just as soon as all preliminary arrangements are made, mass meeting of citizens of Kendallville will be called, to be held in Council chambers, to consider views of public in regard to establishing city hospital.

Des Moines, Iowa—City may buy automobile police patrol as the Police Department appropriation has been increased $2,600.

South Bend, Ind.—Common Council has approved of plans for municipal parks and boulevards, designed by George E. Kessler, of Kansas City, Mo.

Mt. Pleasant, Ia.—Plans are being prepared for erection of new Henry County Court House; cost, $91,000.

Lincoln, Kan.—City is figuring on building City Hall. It will be large enough to have public library in connection, besides rest room and apartments for Fire Department.

Topeka, Kan.—Commissioner Tanchy is considering the purchase of fire patrol wagons.

Lexington, Ky.—Mayor has recommended purchase of auto patrol for Police Department.

Portland, Me.—Conference of members of Board of Trade, C. F. Flagg, president, and Mayor Oakley C. Curtis about harbor improvement plans, decided to get in touch with Boarat Wedenmuth, a German engineer, who designed the docks in Hamburg, and harbor and dock improvements in Boston.

Boston, Mass.—City Treasurer Slattery has awarded $500,000 in 4 per cent. bonds of city of Boston to Estabrook & Co. and R. I. Day & Co. jointly, at 108.23 and interest. Bonds comprise $300,000 Dorchester Tunnel and $200,000 East Boston Tunnel extension.

Fitchburg, Mass.—City has awarded $200,000 4 per cent. bonds to E. H. Rollins & Sons.

Brainerd, Minn.—Council has purchased two lots on northeast corner of Laurel and South 5th sts., for $1,500, as site for city hall.

St. Paul, Minn.—Assembly Committee on Streets has made favorable report on issuing bonds for $70,000 for purchase of playgrounds site in Kittsondale district.

Jefferson City, Mo.—State Board of Fund Commissioners has sold $124,000 of State Capital bonds as follows: National Bank of Salem, $1,000; National Bank of Warrensburg, $20,000; First National Bank, of Carthage, $10,000; Bank of Garden City, $1,000; Exchange Bank of Jefferson City, $25,000; Merchants' Bank of Jefferson City, $10,000; Central Missouri Trust Co., Jefferson City, $25,000; Gordon & Church, Jefferson City, $5,000; State Bank of Bevier, $2,000; First National Bank of Jefferson City, $25,000: total, $124,000.

Blair, Neb.—Erection of combined city hall and fire house is being considered.

Omaha, Neb.—Bids for purchase of dipper dredge for Park Department have been rejected. New plans will be made.

Omaha, Neb.—Comptroller Fred H. Cosgrove has sold $50,000 city hall bonds to Spetzer-Rorick Co., Toledo, O.

Atlantic City, N. J.—Chairman S. S. Phoebus of Boardwalk Committee, has been authorized by City Council to secure bids for 125,000 ft. of lumber for extension of Boardwalk and its widening below Missouri ave. Bids are to be opened by Council at its next regular meeting.

Millburn, N. J.—Tentative plans for new municipal building are being discussed by Township Committee.

Brooklyn, N. Y.—Borough President Connolly of Queens has forwarded to Board of Estimate communication setting forth needs of borough and amount is estimated at $3,082,618.85. First demand of President Connolly is for sum of $726,500 for purposes of acquiring land and constructing refuse destructors in several sections of borough. Sum of $500,000 is asked for purpose of acquiring site and for construction of new borough hall. Sum of $20,000 is asked for construction of floating bath at College Point.

Buffalo, N. Y.—Bids will be received until 12 noon, Feb. 2, by Wm. G. Justice, City Comptroller, Room 3, City and County Hall, for purchase of $95,000 registered park bonds.

Cohoes, N. Y.—Improvements have been recommended by State prison officials for Cohoes jail.

Harrietstown, N. Y.—Town Board of Harrietstown is considering plan to build new jail at rear of Town Hall in Main st.

New York City, N. Y.—Work will start in early spring on reconstruction of Speedway wall along Harlem River; estimated cost $500,000.

Saranac Lake, N. Y.—Proposition to purchase waterproof, iron-covered wagons for garbage collection will probably be submitted to taxpayers in special resolution at annual village election in April.

Schenectady, N. Y.—Commissioner of Public Works Mullen has put in budget an allowance of $2,000 for an automobile.

Schenectady, N. Y.—Mayor recommends establishment of public market place.

Yonkers, N. Y.—Board of Estimate has voted to establish the Fourth Police Precinct.

Cleveland, O.—County Commissioners are advertising $500,000 bonds for sale, Feb. 28.

Cleveland, O.—Council will be asked by City Board of Efficiency to issue bonds as follows: New city hospital, $650,000; new police and fire stations, $75,000; cottage at boys' farm, $25,000; city farm, infirmary and workhouse improvements, $150,000; general park improvements, $350,000; sewer and paving work, $450,000; west side market completion, $25,000.

Guthrie, Okla. — It is expected that work of constructing bath house and other improvements at Mineral Wells Park will start shortly; estimated cost, $100,000.

Klamath Falls, Ore.—Local capitalists are reported as willing to take up bonds rejected by E. H. Rollins & Son, Denver. New charter is being prepared permitting greater bonded indebtedness for city.

New Castle, Pa.—Ordinance submitting question of $500,000 bond issue to people failed to pass.

Philadelphia, Pa.—Ordinance is pending providing $3,000 for purchase of automobile.

Philadelphia, Pa.—Controller Walton has asked for $50,000 and Recorder Tustin, $36,300, to make alterations and modernize their office equipment. Steel filing cases are included, also typewriters and a mimeograph.

Pittsburgh, Pa.—Extension of park system is being considered.

Columbia, S. C.—Bids on abattoir, which have been examined by Committee of Council appointed by W. H. Gibbes, Mayor of Columbia, have been rejected. There were two bids. One was by Cincinnati Butchers' Supply Co. for $15,500, with supplementary bid of $700 for extension of equipment not specified in plans for work of the first part; other bid was from Brecht Co. of St. Louis, who offered to furnish abattoir complete for $15,534.

Chattanooga, Tenn.—Bids will be received up till noon, Feb. 10, at office of County Judge in Municipal Bldg., for following coupon bonds of Hamilton County; $350,000 for court house, $75,000 for jail, and $65,000 for Lookout Mountain rd.

Nashville, Tenn.—Following bills have been introduced by Board of Public Works: To appropriate $10,000 for remodeling of police station; $3,000 for purchase of automobile for Mayor and Board of Public Works; $5,000 for construction of stone wall on 4th ave. side of city cemetery; $700 for purchase of automobile for use in City Health Department.

Dallas, Tex.—On April 2 citizens will vote on bond proposition covering following items: City Hall, water purification plant, downtown fire station, purchase of more park property and improvement of present parks, water improvement, sanitary sewer, street improvements.

Lynchburg, Va. — Council has sold $550,000 public improvement bonds to Townsend Scott & Son, Baltimore.

Portsmouth, Va.—Mayor Reed has recommended building of new market house.

Spokane, Wash.—Commissioner Fassett has proposed plan for financing new city hall under proposed $325,000 six-story plans, which, he hopes, will break down opposition of Mayor Hindley and Commissioner Fairley to six-story idea and result in unanimous agreement of the Commissioners.

Niagara, Falls, Ont., Can.—Queen Victoria Park Commissioners have decided that all bonds that they can spare from their 1912 estimates will be used upon boulevard construction work.

CONTRACTS AWARDED

Aurora, Ill.—By City for construction of garbage crematory, to Dixon Engineering & Construction Co., of Toledo, O., at $9,316.

Portland, Me.—By City Hall Building Commission, for steel furniture, filing cabinets, book-shelves, vault fittings, etc., for new City offices, to Bank and Office Equipment Co., of Devonshire st., Boston, at $2,828.99.

Boston, Mass.—Mayor Fitzgerald has signed contract with Boston Development & Sanitary Co., for 10-year garbage and refuse disposal, for $1,432,000. According to this contract, ashes, which are regarded as clean, will be placed on public dumps.

Lynn, Mass.—For 60,000 bricks to be used by Department of Streets and Highways in manhole and kindred construction, to Fred J. Graham, lowest bidder, whose price is $9.50 per 1,000.

Reading, Pa.—By Water Commissioners to W. K. Haskins for planting flowers at reservoir, at $1,420.

BIDS RECEIVED

Leavenworth, Kan.—By County Commissioners for rebuilding court house (a) with tower, (b) without tower: Fred Tarry & Son, (a) $114,939, (b) $107,900; J. W. Wright, (a) $129,000, (b) $118,250; R. B. Yoakum, (a) $119,500, (b) $112,250; J. H. Petty, Paola, (a) $114,010, (b) $106,010; J. C. Taylor, K. C., (a) $119,147; (b) $110.572; J. B. Betts, Topeka, (a) $113,364, (b) $104,789.

Boston, Mass.—For collection and removal of ashes for one year in Brighton, West Roxbury and East Boston districts as follows: For collection and removal in Brighton, J. H. McNamara submitted lowest bid, $11,880 a year. M. H. Loonie bid $11,964, and Joseph McGreevey, $12,200. For West Roxbury, John J. Moore

bid $7,800, and Joseph Sprissler, $9,600. For East Boston, the bidders were Antonio De Stefano, $11,499.96; Agostino De Stefano, $12,984; Charles Berman, $13,000; B. E. Grant, $14,160, and Coleman Bros., $15,900.

Fall River, Mass.—By City for collection and disposal of garbage for terms of one, three and five years: Charles F. Menard, three years, $11,780 per annum; five years, $11,780 per annum; one year, $12,000 per annum. Benjamin W. Brown, one year, $9,000; three years, $26,400, or $8,800 per annum; five years, $42,400, or $8,480 per annum. Hormidas Boudreau, three years, $30,473, or $10,158 per annum; five years, $50,968, or $10,194 per annum. James McNamara, one year, $8,995. James Brazeil, three years, $31,422, or $10,474 per annum; five years, $54,990, or $10,998 per annum. W. C. Gardner, one year, $9,000; three years, $25,800, or $8,600 per annum; five years, $39,000, or $7,800 per annum. A. M. Reed, one year, $9,500; three years, $26,400; five years, $43,800. A. H. Barney, Seekonk, one year, $8,400; three years, $24,900, or $8,300 per annum; five years, $45,000, or $9,000 per annum.

Philadelphia, Pa.—By Director Neff, of Board of Health, for erecting 2 additional ward buildings, each 2-story brick, and a connecting corridor at the Philadelphia Hospital for Contagious Diseases: Jas. B. Doak & Co., $122,680; John R. Wiggins & Co., $123,000; Edw. Fay & Sons, $124,870; P. J. Hurley, $126,397; Wm. R. Dougherty, $126,724; Mitchell Bros., $127,000; B. Ketcham's Son, $127,032; Doyle & Co., $127,380; Harry H. Weymeyer, $128,000; Sax & Abbott, $129,010; John W. Emery, $133,410; Abel. Bottoms & Sons Co., $138,494.

Alma, Wis.—To C. E. Hagstrom & Co., Northwestern Bldg., for erection of reinforced concrete jail building at Alma, Wis., at $8,892. Other bids were as follows: Peter Schwab, Winona, Minn., $11,667; Northern Construction Co., La Crosse, Wis., $10,485; Lewis Crafts, Winona, Minn., $10,985; L. A. Swabb, Fountain City, Wis., $10,000; Herman Construction Co., Antigo, Wis., $9,490; John Luce, Winona, Minn., $8,946. John A. Trane, La Crosse, Wis., was awarded the heating, plumbing and electrical work, and the Van Doran Iron Works the jail cell work.

TOO LATE FOR CLASSIFICATION

BIDS ASKED FOR

STATE	CITY	RECEIVED UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREET IMPROVEMENTS	
Alabama	Talladega	Feb. 5	Drain and surface with gravel about 4½ miles of road	County Road Comm.
Kentucky	Louisville	Feb. 9, 2 p.m.	Reconstrn. a number of alleys with vitrified brick	R. G. McGrath, Sec. Bd. Pub. Wks.
New York	Buffalo	Feb. 10, 11 a.m.	Pavg. or repaving 5 streets	F. G. Ward, Commissioner.
Ohio	Cincinnati	Feb. 23, noon	Improvg. Cornell avenue	Stanley Struble, Pres. County Comm.
Iowa	Mason City	Mar. 1 (about)	Constrn. 1¼ miles cement paving	F. C. Wilson, City Eng.
			SEWERAGE	
New York	Brooklyn	Feb. 7, 11 a.m.	Constrn. sanitary outlet sewers and storm water sewers, including clay pipe, iron pipe and reinforced concrete sewer up to 90 in. in diameter; cost, $183,000	A. E. Steers, Pres. Boro. Bklyn.
Ohio	Chillicothe	Mar. 1 (about)	Constrn. 3,000 ft. 8-in. pipe sewers	Ed. Albright, Dir. Dept. Pub. Serv.
			WATER SUPPLY	
New York	NewYork	Feb. 9, 2 p.m.	Furn., delivering and laying water mains and repairing pumping station; 3 contracts	H. S. Thompson, Comm.
Alabama	Greenwood	Feb. 14	Constrn. water works	W. G. Franz, Eng., Union Trust Bldg, Cincinnati, O.
Georgia	Macon	Feb. 21, noon	Constrn. pump. sta, furn. 2 single stage centrifugal pumps, cap. 4,500 gal. per min. each; also hydrants and valves	W. H. Fetner, Chm. Water Comm.
			LIGHTING AND POWER	
Georgia	Macon	Feb. 21	Furn. two 75-h.p. induction motors, two 500-h.p. induction motors, four 40-KVA oil-cooled transformers	W. H. Fetner, Chm. Water Comm.
			BRIDGES	
Ohio	Cincinnati	Feb. 16, noon	Constrn. concrete bridge on river road	Stanley Struble, Pres. County Comm.
			FIRE EQUIPMENT	
New York	New York	Feb. 5, 2 p.m.	Furn. double nozzle fire hydrants, lay'g water mains & appur.	H. S. Thompson, Comm.
New York	Niagara Falls	Feb. 20, 2.30 p.m.	Furn. 1 automobile comb. pump'g fire engine, 1 comb. chem. & hose motor car with 50-gal. tank & 1 fire chief's auto	O. F. Utz, Chief Fire Dept.
			MISCELLANEOUS	
Massachusetts	Boston	Feb. 2, noon	Collectg. & removg. garb. W. Rockford Dist. & Brighton Dist.	L. K. Rourke, Commissioner.
Massachusetts	Boston	Feb. 16, 3 p.m.	Budg. concrete shelters at Copps Hills Terraces; also furn. 40-h.p. gasoline engine	Park Commissioners.

STREET IMPROVEMENTS

Lasalle, Ill.—Negotiations have been opened by Illinois Park Commission with Chicago Automobile Association for construction of State road through Ottawa and Starved Rock State Park to Lasalle and from there to Peoria.

Bloomington, Ind.—Seven blocks of 4th st. will be paved.

Converse, Ind.—About half mile of paving will be done. Bids will be taken on four kinds of paving.

Marion, Ind.—One block of 17th st. will be paved. Bids will be taken on four kinds of paving.

South Bend, Ind.—O. C. Schockney, Lincoln Township, is circulating petition for presentation to County Commissioners asking for 15 miles of road in that township. Gravel is the material considered.

Detroit, Mich.—County Commissioners expect to spend $500,000 for roads during year.

Grand Rapids, Mich.—Board of Public Works has submitted to Council following estimates for paving: Bituminous concrete, Packard st., $5,050; grading and gravelling Packard st., $3,350; paving Packard st. with brick on concrete base, $5,775; paving South Prospect st. with brick on concrete, $9,150; grading and gravelling South Prospect st., $4,800; grading and gravelling South Lafayette st., $13,600; paving South Lafayette st. with brick on concrete, $24,000; grading and gravelling South Lafayette st., $5,800; paving South Lafayette st. with brick on concrete, $10,150; grading and gravelling North Lafayette st., $7,650; paving 1st ave. with brick, $15,800; paving Brainard st. with Westrumite, $6,450; grading and gravelling Broadway, $14,000.

Manistee, Mich.—City Engineer George B. Pike is making plans for 15,000 sq. yds. tarvia.

Newark, N. J.—Morris Sherrerd, Chief Engineer, has published notice of intention to pave Elizabeth ave. with asphalt block on concrete foundation, and another portion of street with granite block on concrete; also grading, curbing and flagging three streets.

Albany, N. Y.—Ordinance has been prepared for improvement of Clinton sq.

Schenectady, N. Y.—Sum of $11,000 has been included in Budget for purchase of asphalt paving plant.

Watkins, N. Y.—Question of paving village streets is being agitated.

Cincinnati, O.—Plans for improving Cornell Ave., cost $19,242, have been approved by County Commissioners.

Girard, O.—Mayor Blackstone will name committee of eight citizens who will act with Council as General Improvement Committee in matters concerning street sewer and sidewalk improvement.

Massillon, O.—Resolutions have been introduced in Council for paving four streets with brick.

South Richmond, Va.—Committee, P. O. Thurston, Chairman, appointed by Supervisors of Chesterfield County, are considering opening road between Chester and Chesterfield Court House. W. W. LaPrade is County Engineer.

Fredericksburg, Va.—Fredericksburg Motor Club will hold Good Roads meeting Feb. 22, to promote movement for highway from Richmond to Washington.

Delavan, Wis.—Sheet asphalt with cement curb and gutter will be laid on parts of three streets.

CONTRACTS AWARDED

East St. Louis, Ill.—By Board of Public Improvements, to Meyer Construction Co., East St. Louis, paving Exchange ave., $2,480.40; to Murphy Construction Co., for paving Broadway, $15,596.75.

La Porte, Ind.—By City, to Wm. T. Smith & Co., Rensselaer, Ind., for constructing 11 miles of road, including concrete bridge with steel superstructure.

La Porte, Ind.—By County Commissioners, to H. M. Hutchinson & Ackerman, Michigan City, Ind., for constructing about 10 miles macadam road.

Detroit, Mich.—By J. J. Haarer, Commissioner of Public Works, for Portland cement, as follows: Burt Portland Cement Co., for 40,000 bbls., at 85 cents per bbl.; New Aetna Portland Cement Co., for 10,000 bbls., at 91 cents per bbl.; Michigan Portland Cement Co., for 10,000 bbls., at 91 4-10 cents per bbl., and Wyandotte Portland Cement Co., for 15,000 bbls., at 94 cts. per bbl. Contract also awarded for furnishing cedar blocks, to W. E. Currie, No. 1 blocks, 42 cents per sq. yd.; No. 2 blocks, 30 cents per sq. yd. For tar, to John Archer, $11.25 per ton in barrels, $12.50 in tanks.

BIDS RECEIVED

Hartford, Conn.—For construction of State road work in various towns, as follows: Westport, 8,545 lin. ft. macadam-telford on Riverside ave., light grading: (a) Macadam, lin. ft., (b) telford, lin. ft., (c) rubble drain, lin. ft., (d) gutter drain, lin. ft., (e) culvert station 17, (f) culvert station 50, (g) concrete wall, cu. yd., (h) masonry wall, cu. yd., (i) dry rubble wall, cu. yd.—B. D. Pierce, Jr., Co., Bridgeport, Conn., (a) $1.84, (b) $2.54, (c) 90c., (d) $1, (e) $500, (f) $200, (g) $8, (h) $6.50, (i) $5; O. T. Benedict, Pittsfield, Mass., (a) $2.19, (b) $2.79, (c) $1, (d) 75c., (e) $200, (f) $400, (g) $6, (h) $6, (i) $5; Pier-